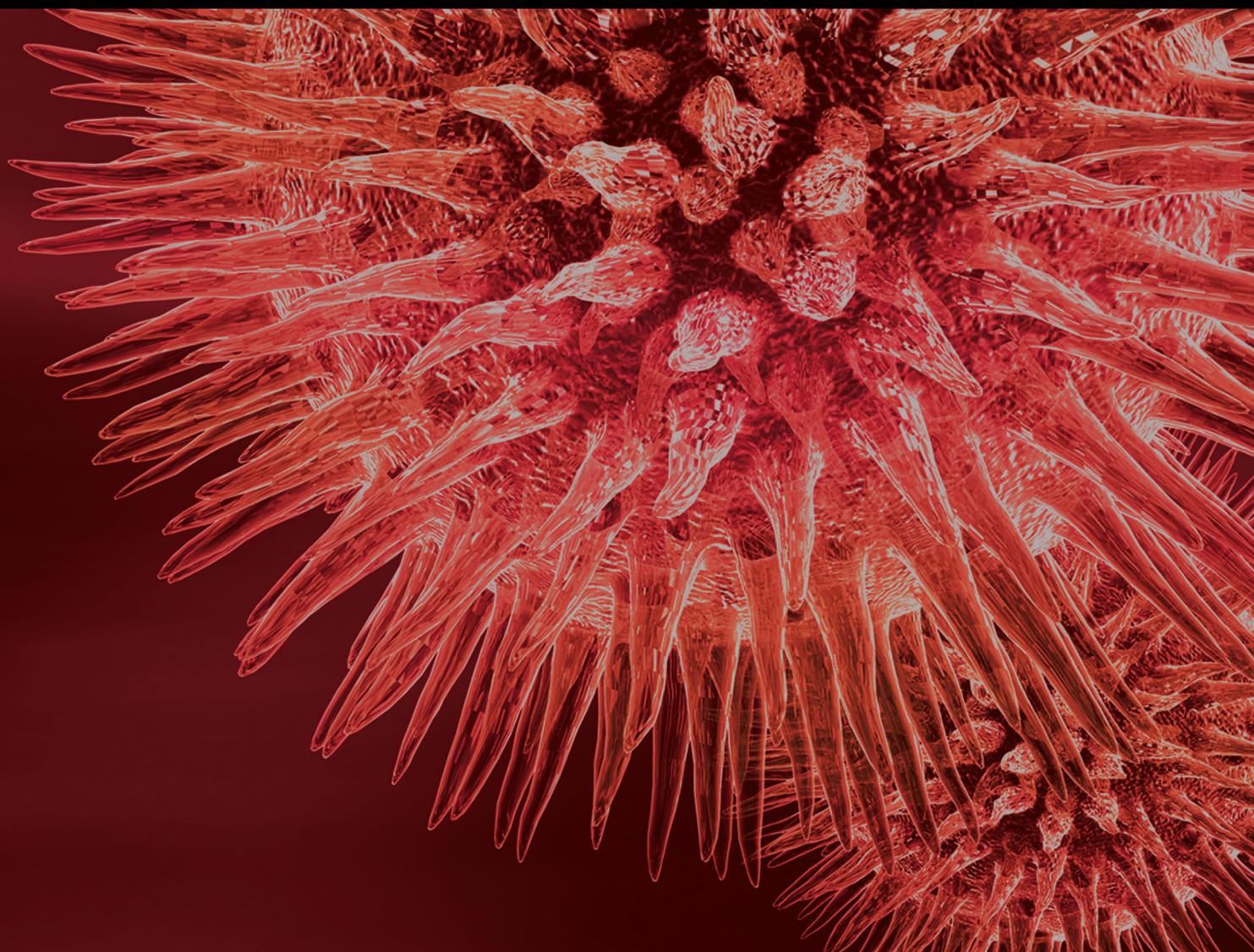


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Contemporary Perspective on Addictive Behaviors: Underpinning Mechanisms, Assessment, and Treatment

Lead Guest Editor: Silvia Cimino

Guest Editors: Carlos A. Almenara, Luca Cerniglia, Avinash Desousa, and Angelo G. I. Maremmani





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Editorial

Contemporary Perspective on Addictive Behaviors: Underpinning Mechanisms, Assessment, and Treatment

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This special issue gathered contributions from authors in the scientific community working on addictive behaviors. In particular, authors were solicited to relate about underpinning mechanisms, assessment protocols, and intervention programs that are currently proposed for substance abuse, Internet addiction, and other forms of problematic conducts in pediatric populations, adolescence, and adulthood. Most of the papers used a biopsychosocial model for the onset and maintaining of addictive behaviors and their comorbidities with other psychopathologies. Although the intent was accept contributions focused on all forms of addictive behaviors, this special issue is composed of four papers concerning problematic use of the web and two articles focusing on substance use. Of note, all papers addressed the developmental phases of childhood and adolescence.

In the paper by M. Fuchs et al. entitled “Pathological Internet Use—An Important Comorbidity in Child and Adolescent Psychiatry: Prevalence and Correlation Patterns in a Naturalistic Sample of Adolescent Inpatients” the authors assessed the prevalence of comorbid Pathological Internet Use in a sample of adolescent with psychiatric disorders with the aim of unveiling correlations between PIU and psychiatric comorbidities. They found a very high prevalence of PIU among psychiatric patients and, in particular, addictive Internet use and problematic Internet use were, respectively, 8

times and 3 times higher among adolescents with psychiatric disorders, compared to a matched control sample.

In the paper by D. Öztaş et al. entitled “Evaluation of Risk Factors Affecting Substance Use among Tenth-Grade Students” the authors aimed to assess the prevalence of substance use among a large population of students, evaluating their thoughts, attitudes, behaviors, and tendencies towards substance use. They found that being male, being over the age of 15, living in in low income family with separated mother and father, and not being content with life were among the most significant risk factors for substance use.

In the paper by G. Ballarotto et al. entitled “Adolescent Internet Abuse: A Study on the Role of Attachment to Parents and Peers in a Large Community Sample” the authors evaluated the Internet use and abuse, the adolescents’ attachment to parents and peers, and their psychological profiles in a large community sample of adolescents. They found that adolescents’ attachment to parents had a significant effect on their use of the web. Moreover, adolescents’ psychopathological risk had a moderating effect on the relationship between attachment to mothers and Internet use.

In the paper by S. Cimino and L. Cerniglia entitled “A Longitudinal Study for the Empirical Validation of an Etiopathogenetic Model of Internet Addiction in Adolescence Based on Early Emotion Regulation” the authors aimed

at verifying if early emotion regulation strategies were predictive of school-age children's internalizing and externalizing symptoms, which in turn fostered Internet addiction in adolescence. Their results confirmed these hypotheses and indicated a direct statistical link between the characteristics of emotion regulation strategies in infancy and IA in adolescence.

In the paper by A. Porreca et al. entitled "Emotional Availability, Neuropsychological Functioning, and Psychopathology: The Context of Parental Substance Use Disorder" the authors aimed at investigating how maternal neuropsychological functioning and psychopathology are associated with mother-child emotional availability (EA), in the context of parental substance use disorder. In the study sample, they found high rates of maternal neuropsychological impairments and psychopathology, and generally low levels of EA were revealed. Moreover, maternal neuropsychological functioning was significantly associated with mother-child EA.

In the paper by C. Trumello et al. entitled "Relationship with Parents, Emotion Regulation, and Callous-Unemotional Traits in Adolescents' Internet Addiction" the authors aimed to investigate the associations between relationship with parents, emotion regulation, and callous-unemotional traits with Internet addiction in a community sample of adolescents. They found that a low perceived maternal availability, high cognitive reappraisal, and high callousness appeared to be predictors of Internet addiction.

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We would like to express our appreciation to all authors for their informative contributions and the reviewers for their support and constructive critiques in making the special issue possible.

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Luca Cerniglia
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Research Article

Relationship with Parents, Emotion Regulation, and Callous-Unemotional Traits in Adolescents' Internet Addiction

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The aim of this study was to investigate the associations of relationship with parents, emotion regulation, and callous-unemotional traits with Internet addiction in a community sample of adolescents. Self-report measures of relationship with parents (both mothers and fathers), emotion regulation (in its two dimensions: cognitive reappraisal and expressive suppression), callous-unemotional traits (in its three dimensions: callousness, uncaring, and unemotional), and Internet addiction were completed by 743 adolescents aged 10 to 21 years. Results showed that a low perceived maternal availability, high cognitive reappraisal, and high callousness appeared to be predictors of Internet addiction. The implications of these findings are then discussed.

1. Introduction

Adolescence is known to be a period of major transformations in psychological and bodily aspects, openness to new experiences, and construction of a personal identity. In this process, an important role is played by new technologies, which attract much interest among young people, as a means to promote social relationships [1] and to freely explore a "wider world".

The Internet, accessible through a large number of devices, is highly integrated in the daily experiences of adolescents [2, 3]. Recent studies found associations between new technology use (e.g., the Internet and video games) and typical adolescent needs, such as self-affirmation, belonging, and identity exploration [4, 5]. Despite the normative nature of and subsequent convenience provided by new technology use among adolescents, an excessive use can potentially become problematic, as it may result in serious psychosocial dysfunction, evident in arguments with and lying to relatives and friends, poor achievement, and social withdrawal [6, 7].

However, previous results on the association between time spent online and problematic Internet use, as synthesised in a meta-analysis by Tokunaga and Rains [8], are not so obvious as it might be supposed. In fact, some authors (e.g., [9]) underlined a positive relation between time using Internet and Internet addiction, while others (e.g., [10]) found only a weak association.

More generally, many authors have recently underlined the risk factors related to a problematic Internet use among adolescents [11–14], including the possibility of Internet addiction [15]. Despite the controversies about a consistent nomenclature (e.g., Internet dependency, problematic use of the Internet) and the criteria for Internet addiction, the consensus among researchers is that adolescents may especially be at risk for the detrimental use of the Internet [16] because of their limited capacity of self-regulation and their vulnerability to peer pressure [17].

The problematic use of the Internet is characterised by some aspects that are also present in other addictive disorders [18]. Block [19] particularly identified the four following

components: excessive use (with a loss of one's sense of time), withdrawal (including a sense of anger and/or depression and anxiety when the Internet is not available), obsession (constant need for better digital technologies or more hours of use), and negative consequences (arguments, lying, poor achievement, and social isolation).

Consistent with this view, we use the term "Internet addiction" in this study to refer to the damaging use of the Internet as linked to dysfunctional effects on the emotive and social areas of adolescents' life [20]. As Tokunaga [21] suggested in a recent meta-analysis, clinicians described this addiction as a loss of conscious self-control over Internet use. Many studies underlined the loss of self-control in populations susceptible to addiction (e.g., anxious/depressed people), in regular Internet users [22] and, in an increasingly worrying way, among adolescents [15, 23, 24].

Research has demonstrated that difficulties in emotion regulation play an important role in situations of addictive behaviours [25, 26], problematic use of the Internet [27, 28], and pathological use of social networking sites [29]. According to Gross et al. [30], emotion regulation is a subtype of affect regulation (the other subtypes are coping and mood regulation) that refers to attempts to influence emotional experience, whether consciously or unconsciously, and may involve the up- or downregulation (i.e., increase or decrease) of various aspects of positive or negative emotions [31]. Two commonly used strategies for downregulating emotion are *cognitive reappraisal* and *expressive suppression*. Reappraisal involves changes in the way a situation is construed to decrease its emotional impact in negative emotion contexts. By contrast, suppression inhibits the external signs of inner feelings and the emotion-expressive behaviour [32].

Compared with research on adults, fewer studies have explored emotional regulation as linked to Internet addiction in adolescents, focusing mainly on the connection between emotional regulation and a problematic Internet use.

For example, in a study that involved 525 high school students, Yu et al. [33] observed that adolescents' difficulties in emotion regulation were significantly associated with problematic Internet use. Another recent research [34], conducted on a sample of 380 adolescent students from a secondary school in Italy, confirmed that emotion regulation was negatively correlated with a dysfunctional use of the Internet. However, there is a lack of knowledge regarding which emotion regulation strategy plays a major role in these dysfunctional behaviours.

Another important aspect studied in empirical research on adolescents' Internet addiction is the possible influence of relationship with parents. In the literature, the consensus is that adolescents' relationship with their parents may deeply influence their psychosocial well-being [35, 36] and life satisfaction and that different parenting styles are linked to different psychosocial profiles, particularly in the self-concept domain [37].

In several studies, Yu and Gamble [38–40] stated that adolescents who perceived their parents as warmer and non-rejecting were less likely to exhibit negative or problematic psychosocial behaviours. On the contrary, adolescents whose parents were perceived to be more rejecting and unsupportive

demonstrated a greater risk for problematic behaviours and psychosocial outcomes, such as Internet addiction [41].

Several studies have investigated the correlation between the quality of parent–adolescent relationship and problematic Internet use. For example, positive parental relationships were found to be negatively correlated with Internet addiction [42], whereas conflictual relationships were positively associated with Internet addiction [43]. In the presence of Internet addiction, adolescents described their parents as lacking in warmth, more intrusive, rejecting, and punitive [44].

However, while numerous studies have examined the connection between Internet addiction in adolescence and quality of parental relationship, research with a specific focus on adolescents' Internet addiction and parents' perceived emotional availability [45] is lacking.

Emotional availability refers to a set of aspects (e.g., support, sensitivity, and responsiveness) that relate to the emotional bond with parents [46]. According to Lum and Phares [45], this construct is consistent with theoretical and empirical evidence that emotionally available parents are related to a child's greater sense of security, promoting the development of personal and interpersonal competencies.

All these aspects suggest the importance of exploring different factors, individual and interpersonal, which may increase or decrease the risk of adolescents' problematic Internet use.

In this frame, we examined an additional factor, the role of callous-unemotional (CU) traits, which, in recent years, have been the focus of much attention in studies on behavioural problems [47, 48]. CU traits can be defined as a set of characteristics including lack of empathy, remorse and guilt, and lack of concern about the negative impacts of one's own actions [49]. The growing interest on CU trait assessment resulted in the development of the Inventory of Callous-Unemotional Traits (ICU) by Frick and colleagues [50, 51]. The three following dimensions are analysed with the use of this widely used self-report tool: *callousness*, which refers to the lack of empathy, guilt, and remorse for misdeeds; *uncaring*, which encompasses lack of care for one's own actions and for other people's feelings; and *unemotional*, which refers to shallow or deficient affects [52, 53].

Although CU traits have been traditionally considered the core affective dimension of psychopathy, several studies found their association with poor peer relationships, low prosociality, and psychosocial maladjustment in community adolescents [47, 53, 54]. Previous research also highlighted the relation of CU traits with aggressiveness, drug consumption, and multiple psychosocial impairments in children and adolescents [48, 55]. Commenting on the findings of studies on this topic, Viding and McCrory [54] suggested that CU traits may, overall, be considered a risk factor for poorer social functioning.

So far, despite previous research showing the association of CU traits with psychosocial maladjustment, no published study has focused on the relationship between CU traits and Internet addiction.

Starting from these premises, the current research pursued different goals. First, we aimed to analyse the associations between the use of new technologies and the Internet

addiction. Given the results of existing research, we expect a positive correlation between these two variables.

Second, we aimed to explore if and to what extent three specific areas, namely, perceptions of parenting relationship (in terms of emotional availability), emotion regulation strategies (cognitive reappraisal and expressive suppression), and CU traits (callousness, unemotional, and uncaring), may be related to Internet addiction. Specifically, we hypothesised that perceptions of a low parenting relationship and high levels of CU traits could be possible predictors of Internet addiction.

With regard to emotion regulation, even if other studies have explored this issue, the particular emotion regulation strategy that may be involved in Internet addiction during adolescence is unclear. Thus, in this study, we aimed not only to explore the relation between emotional regulation and Internet addiction in this particular phase of development but also to verify whether a particular emotion regulation strategy (cognitive reappraisal and/or expressive suppression) may be predictive of Internet addiction. Given the lack of specific research exploring individual emotion regulation strategies, we do not advance any hypothesis on whether and what particular emotion regulation strategy may have a predictive power for Internet addiction.

2. Materials and Methods

2.1. Participants. The study was conducted on 743 Italian participants aged 10 to 21 years ($M_{\text{age}} = 15.64$; $SD_{\text{age}} = 2.08$; 57.6% females). They were recruited in public schools in urban and suburban areas of Chieti and Rome. Paper-and-pencil questionnaires were administered, and all participants gave their informed consent in accordance with the Declaration of Helsinki. For underage participants, written informed consent was also obtained from their parents and from school authorities. The Ethics Committee of the Department of Psychological Sciences of the University approved this study.

2.2. Measures

Sociodemographic Data. The participants reported their age, gender, and information regarding their family.

New Technology Use. Nine items selected from the Questionnaire about New Digital Technologies (QNDT) were administered to evaluate some behaviours related to Internet and video game use. Two items measured the amount of time spent online daily and the amount of time spent on video games daily on a four-point Likert scale ranging from 1 (*less than 1 hour*) to 4 (*more than 3 hours*), and five items assessed the role of parents in Internet use on a four-point Likert scale ranging from 1 (*never*) to 4 (*very often*). Specifically, the items investigated playing video games with the mother, playing video games with the father, using the Internet with the mother, using the Internet with the father, and quarrels with parents on the amount of time spent on the Internet or on video games. Finally, two dichotomous items evaluated parental restriction and making friends online (0 = *no* and 1 = *yes*).

Perceived Emotional Availability of Parents. To evaluate the participants' perception of maternal and paternal emotional availability, we administered the two versions of the Lum Emotional Availability of Parents (LEAP) questionnaire [45, 56, 57]. Each version (LEAP-mother and LEAP-father) comprised the same 15 items rated on a six-point Likert scale ranging from 1 (*never*) to 6 (*always*). A higher score reflects a higher level of perceived emotional availability. Both LEAP-mother and LEAP-father reached good reliability, with a Cronbach's alpha of .94 and .96, respectively.

Emotion Regulation. The Emotion Regulation Questionnaire (ERQ) [58, 59] was administered to assess expressive suppression and cognitive reappraisal, two specific emotion regulation strategies which are typically used to manage positive and negative emotions in daily life. The expressive suppression scale is composed of four items evaluating the inhibition of emotion-expressive behaviour. The cognitive reappraisal scale is composed of six items evaluating the cognitive ability of modifying the meaning and the emotional impact of a situation. All items were rated on a seven-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). The expressive suppression scale and the cognitive reappraisal scale obtained a Cronbach's alpha of .60 and .79, respectively.

Callous-Unemotional Traits. The Inventory of Callous-Unemotional Traits (ICU) [50, 52] is a self-report questionnaire that evaluates callous-unemotional traits, which were theorised by Frick et al. [60]. These traits are the affective dimension of psychopathy [61] and refer to the lack of empathy, guilt, and any emotional expression. The factor structure of the scale showed the presence of three subscales: callousness (nine items), unemotional (five items), and uncaring (eight items).

"Callousness" assessed the lack of empathy and remorse (Cronbach's alpha of .68), "unemotional" assessed the lack of emotional expression (Cronbach's alpha of .59), and "uncaring" assessed the insensitivity towards others' emotions and task performance (Cronbach's alpha of .70). All items were rated on a four-point Likert scale ranging from 0 (*not at all true*) to 3 (*definitely true*).

Internet Addiction. Internet addiction was evaluated with the 10-item Internet addiction subscale added to the Shorter Promis Questionnaire (SPQ) [62] in the SPQ Italian validation [63]. This scale measured several indexes of Internet addiction, such as difficulty in stopping Internet use, concerns of others about Internet use, and the feeling of safety and emotional relief provided by Internet use. In this study, we used only nine items; we removed the item "I connect to the Internet several times during the day" because more than 75% of the participants answered above 3 on a six-point Likert scale ranging from 1 (*not at all true*) to 6 (*definitely true*). This psychometric problem could be due to the current lack of discriminant validity of this item. Nowadays, people are continuously connected to the Internet through their smartphone. Thus, the final scale, composed of nine items, reached a good reliability, with a Cronbach's alpha of .74.

2.3. Data Analysis. For descriptive purposes, we computed the correlations among the nine variables of the QNDT and Internet addiction to explore how the use of the Internet and video games and the role of parents are related to Internet addiction among young people. Then, the correlations among perceived maternal and paternal availability (LEAP-mother and LEAP-father), the two ERQ dimensions (cognitive reappraisal and expressive suppression), the three ICU dimensions (callousness, unemotional, and uncaring), and Internet addiction were computed. Afterwards, a multiple linear regression analysis was run to investigate whether perceived maternal and paternal availability, emotion regulation strategies, and callous-unemotional traits could lead to Internet addiction. In our study, we considered all investigated variables (perceived maternal and paternal availability, two emotion regulation strategies, and three callous-unemotional traits) as predictors, according to J. Cohen and P. Cohen [64] and Cohen et al. [65]. In fact, according to them, in regression analysis, the criteria (dependent variable) are regressed on the predictors (independent variables), and these terms avoid the possible interpretation of casual effects among variables.

3. Results

3.1. Correlations between Internet Addiction and New Technology Use. Internet addiction was negatively and weakly related to age. Conversely, Internet addiction was positively and modestly related to the amount of time spent online daily, the amount of time spent on video games daily, making friends online, and quarrels with parents on the amount of time spent on the Internet or on video games. On the contrary, Internet addiction was not related to gender, playing video games with the mother, playing video games with the father, using the Internet with the mother, using the Internet with the father, and parental restriction. The correlations and descriptive statistics are reported in Table 1.

3.2. Correlations among Perceived Parental Availability, Emotion Regulation Strategies, Callous-Unemotional Traits, and Internet Addiction. Internet addiction was negatively and weakly related to perceived maternal availability. Conversely, Internet addiction was positively and weakly related to cognitive reappraisal and expressive suppression. Moreover, Internet addiction was positively and modestly related to callousness. The correlations and descriptive statistics are reported in Table 2.

3.3. Multiple Linear Regression Analysis. A multiple linear regression analysis was run to determine whether perceived maternal and paternal availability, emotion regulation strategies (i.e., cognitive reappraisal and expressive suppression), and callous-unemotional traits (i.e., callousness, unemotional, and uncaring) could lead to Internet addiction. Perceived maternal availability, $\beta = -.10$, $p = .02$; cognitive reappraisal, $\beta = .08$, $p = .03$; and callousness, $\beta = .24$, $p < .001$ turned out to be significant predictors of Internet addiction, accounting for 8.1% of the variance, $R = .28$, $p < .001$. Thus, low maternal availability, high cognitive

reappraisal, and high callousness appeared to be predictors of Internet addiction. The full statistics of the model are reported in Table 3.

4. Discussion

This study was developed to explore the association of Internet addiction with the use of new technologies, relationship with parents (both mothers and fathers), emotion regulation (in its two dimensions: cognitive reappraisal and expressive suppression), and callous-unemotional traits (in its three dimensions: callousness, uncaring, and unemotional) among Italian adolescents.

For the first aim, our data showed a positive but modest relationship of time spent on video games and online with Internet addiction. Existing research on this topic produced mixed results [9, 10, 66]. In his analysis Block [19] suggested that an excessive time spent on the Internet characterises Internet addiction, while following Gamito et al.'s suggestion [67], a simple frequency of use could not be an indicator of addiction or risk of addiction, since specific uses of the Internet may be addictive. Hence, it might not be appropriate to refer only to the amount of time spent online as the criterion for identifying Internet addiction, because adolescents may use the Internet for different purposes [10], spending a lot of time online, without missing their ability to control this activity.

Therefore, in order to distinguish between adaptive and maladaptive use of the Internet, other processes should be explored, such as emotional and self-regulatory ones.

With regard to emotion regulation, we found a predictive association between cognitive reappraisal and Internet addiction. According to Gross' process model of emotion regulation [68] and his studies on the affective, cognitive, and social consequences of emotion regulation strategies [32], reappraisal is associated with a greater positive emotion experience and expression and a lesser negative emotion experience than suppression is. Therefore, as cognitive reappraisal involves reinterpreting negative emotional stimuli in a nonemotional manner [68], Internet overuse seems to be an attempt of adolescents to avoid difficult emotions through instant emotional gratification or avoidance, distraction, and disengagement [26, 69]. In fact, as Spada et al. [70] stated, an excessive use of the Internet may be a form of maladaptive self-regulatory strategy because it may be useful for distracting adolescents from negative affective states. Besides, contrary to suppression, cognitive reappraisal is evoked early in the emotion generative process, and it is not necessarily a continual self-regulatory effort during an emotional event [32]. As adolescents experience continuous emotional changes and the need for instant emotional gratification, reappraisal can be hypothesised as the most immediate strategy that can be used towards negative emotions.

Our results provide an important contribution to the literature on Internet addiction in adolescents because they showed the predictive power of a specific emotion regulation strategy (cognitive reappraisal) in Internet addiction. However, our findings must be considered with caution, and they require further study.

TABLE I: Correlations among Internet addiction and new technology use.

	1	2	3	4	5	6	7	8	9	10	11	12	M	SD
(1) Gender	1													
(2) Age	.10**	1											15.64	2.08
(3) Time on videogames_QNDT	.16***	.21***	1										2.85	1.03
(4) Time on videogames_QNDT	-.46***	-.24***	-.02	1									1.49	0.81
(5) Videogames with mother_QNDT	.17***	-.08*	.02	-.001	1								1.42	0.62
(6) Videogames with father_QNDT	-.10*	-.20***	-.08*	.18***	.43***	1							1.63	0.72
(7) Internet with mother_QNDT	.15***	.03	.07	-.12**	.34***	.15***	1						2.18	0.75
(8) Internet with father_QNDT	-.10**	-.03	-.001	.07*	.19***	.33***	.47***	1					2.10	0.79
(9) Quarrels with parents_QNDT	.01	-.02	.26***	.06	-.05	-.04	-.03	-.04	1				1.74	0.86
(10) Parental restriction_QNDT	-.11**	-.20***	-.06	.07*	.003	.001	-.03	.01	.05	1			0.46	0.51
(11) Making friends online_QNDT	.07	.14***	.22***	.06	-.04	-.02	-.06	-.01	.10*	-.01	1		0.61	0.49
(12) Internet addiction_SPQ	-.03	-.10**	.25***	.19***	-.01	.01	-.05	-.01	.25***	.02	.15***	1	20.50	7.49

Note. *** $p < .001$; ** $p < .01$; * $p < .05$. Gender was coded as 0 = males and 1 = females.

TABLE 2: Correlations among perceived parental availability, ICU dimensions, ERQ dimensions, and Internet addiction.

	1	2	3	4	5	6	7	8	M	SD
(1) LEAP-mother	1								71.91	13.94
(2) LEAP-father	.47***	1							64.47	17.78
(3) Callousness_ICU	-.11**	-.03	1						5.36	4.14
(4) Unemotional_ICU	-.14***	-.11**	.19***	1					7.31	2.97
(5) Uncaring_ICU	-.26***	-.16***	.34***	.24***	1				7.59	3.94
(6) Cognitive reappraisal_ERQ	.12*	.15***	-.01	-.03	-.24***	1			26.55	7.16
(7) Expressive suppression_ERQ	-.07	-.02	.18***	.49***	.03	.18***	1		14.90	5.00
(8) Internet addiction_SPQ	-.11**	-.05	.24***	.03	.04	.09*	.10**	1	20.50	7.49

Note. *** $p < .001$; ** $p < .01$; * $p < .05$.

TABLE 3: Multiple linear regression analysis ($N = 743$).

Internet addiction	
Predictor	Beta
LEAP-mother	-.10*
LEAP-father	-.02
Callousness	.24**
Unemotional	-.05
Uncaring	-.04
Cognitive reappraisal	.08*
Expressive suppression	.07
Total R^2	.08**

Note. * $p < .05$; ** $p < .001$. The interaction effects between all investigated variables (perceived maternal and paternal availability, the two emotion regulation strategies, and the three callous-unemotional traits) and gender, and between all investigated variables (perceived maternal and paternal availability, the two emotion regulation strategies, and the three callous-unemotional traits) and age were tested to examine the possible moderating effects of gender and age. An initial hierarchical regression analysis was run to verify the interaction effects between gender and all investigated variables on Internet addiction. The interaction terms were entered in the second step, but no significant interaction effects were found. Another hierarchical regression analysis was run to verify the interaction effects between age and all investigated variables on Internet addiction. The interaction terms were also entered in the second step, but no significant interaction effects were found.

Indeed, adolescence is a period of emotive and psychosocial changes, characterised by a hyperactivated emotional-behavioural functioning with a major tendency towards action [71], especially if one lacks self-regulatory strategies [2]. In this phase, because of the lesser emotion self-control capacity, adolescents may be more vulnerable to and at risk for developing addictive behaviours, such as Internet addiction, and other problematic behaviours [72–74].

According to our findings, the callousness dimension was the strongest predictor of Internet addiction among the variables we considered. The two other dimensions encompassed in the ICU, unemotional and uncaring, were not significantly related to Internet addiction. This result is quite new because, to our knowledge, this is the first study to analyse the role of CU traits in this kind of addiction. Among other forms of addictive behaviours, CU traits were found in a prospective study by Wymbs et al. [75] to predict substance use among early adolescent boys; more recently, Romero and Alonso [48] found that, compared with the uncaring and unemotional dimensions, callousness was the strongest predictor of alcohol and cannabis consumption among a sample of Spanish adolescents. The callousness dimension was also associated with gambling disorder in a sample of nonreferred Italian gamblers [76]. These last two studies emphasised the importance of callousness in the comprehension of addictive disorders, a result that resembles that of the current study. More specifically, Internet addiction is often characterised by social isolation and withdrawal, a feature that might be consistent with our findings of a positive correlation with callousness. In fact, callousness may

be considered as the CU trait dimension most closely related to lack of empathy [48].

Even if this did not fall within the objectives of the study, our data showed a highly positive association between the unemotional dimension of CU traits and the expressive suppression strategy of emotional regulation. This finding highlights an overlap between these two constructs, which is not surprising because adolescents with CU traits are classically defined as lacking emotional expression [61] and having limited emotional depth [77] and deficits in emotional processing [78]. Furthermore, we analysed the connection between Internet addiction and the emotional quality of relationship with parents, both mothers and fathers. Our results showed that maternal emotional availability, but not paternal emotional availability, predicted Internet addiction. More specifically, lower levels of emotional quality in maternal relationship were associated with higher levels of Internet addiction. This result is quite new, as previous research did not specifically consider the construct of parental emotional availability and instead focused on the more general parent-child relationship quality. A recent review by Schneider et al. [79] analysed 11 previous studies showing that a poorer quality of parent-child bond correlated with an increased severity in problematic Internet gaming. Moreover, previous studies focusing on adolescents' overall psychological adjustment highlighted that maternal parenting played a more relevant role than paternal parenting did [80, 81]. Overall, an inadequate maternal emotional availability and unemotional exchanges between mother and child may be argued to lead to negative relationships with others, self-perceived loneliness, and sadness [82], which, in turn, may predict the development of Internet addiction [2].

Some limitations of this study have to be considered. First, the exclusive use of self-report tools and the absence of other informants (e.g., parents and/or teachers) do not address the issue of shared method variance bias. Moreover, because of the cross-sectional nature of the research, no causal relationships among the considered variables may be inferred. Lastly, as our data refer to an Italian sample of adolescents, the generalisation of the findings to other countries cannot be done.

Nevertheless, the present research made a relevant contribution to knowledge on the significant factors associated with Internet addiction. In particular, our study was the first to analyse the role played by parental emotional availability, specific emotion regulation strategies, and callous-unemotional traits in Internet addiction.

5. Conclusion

Nowadays, Internet addiction is increasingly studied because of the negative effects this addiction may have on adolescents; it results in a higher risk for aggressive behaviours [83], poorer school performance [84], low quality of interpersonal relationships [85, 86], and an increase in depressive symptoms [15, 87]. Furthermore, adolescents with Internet addiction are more exposed to other important risks linked to the world of the Web, such as cyber bullying, sexual solicitation, and identity theft.

The early recognition of Internet addiction among adolescents and the possibility of preventing this addictive behaviour are crucial. As Di Nicola et al. [88] underlined in a recent study, the last European School Survey Project on Alcohol and Other Drugs [89] report of 2016 stated that “since the Internet has become an integral part of life and is used on a daily basis, the development of patterns of addictive use among children and adolescents needs to be closely monitored and investigated in further studies” and that “measures to prevent adolescents from developing problems associated with gambling, such as debts, psychological deficits and social disadvantages, are of high priority”.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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Research Article

Emotional Availability, Neuropsychological Functioning, and Psychopathology: The Context of Parental Substance Use Disorder

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Parental Substance Use Disorder (SUD) constitutes a high-risk condition for parent-child interactions and child development. Empirical evidence indicates high rates of psychopathology and neuropsychological impairments in individuals with SUD. Despite research indicating that parenting skills are related to psychological well-being and cognitive/neuropsychological functioning, prior studies have not examined the associations between these areas of parental functioning and the quality of parent-child interactions in the context of SUD. *Aim(s)*. The present study adopts an integrated perspective to investigate the way in which maternal neuropsychological functioning and psychopathology are associated with mother-child emotional availability (EA), in the context of parental Substance Use Disorder. *Methods*. Twenty-nine mothers with SUD were assessed in interaction with their children, as well as with respect to their neuropsychological functioning and psychopathology. *Results*. In this group, high rates of maternal neuropsychological impairments and psychopathology, as well as generally low levels of EA, were uncovered. Regression analyses showed that maternal neuropsychological functioning was significantly associated with mother-child EA, specifically sensitivity; the role of maternal psychopathology, however, was only marginally significant. *Conclusion*. In the context of SUD, maternal neuropsychological impairments are significantly associated with mother-child EA. Clinical implications of the findings are discussed.

1. Theoretical Background

Parenting encompasses a wide range of behaviors and emotions, including accurate perception of child cues and appropriate responsiveness to them; provision of protection and nurturance in times of need; understanding of the child's unique perspective in different situations and at different ages; and the nuanced expression of parental love, acceptance, and commitment [1–4]. Parenting behaviors are guided both by one's past experiences as a child and by actual experiences with the baby, which are observed during everyday interactions [5]. Parents' psychological well-being plays a crucial role in determining the quality of such behaviors [6]. Research indicates that the presence of psychopathological symptoms

in the parent, such as anxiety or depression, strongly correlates with less positive parent-child interactions [7, 8].

Moreover, recent research on parenting highlights the strong associations that exist between parenting skills and parents' cognitive functioning, suggesting that adult neuropsychological functioning could be associated with observed caregiving [9, 10]. Within the more global domain of parental cognitive functioning, particular attention has been given to executive functioning (EF). EF is considered responsible for different cognitive processes, such as inhibition, attention, cognitive flexibility, planning, and emotion regulation [11]. These higher-level cognitive processes are responsible for the control and the regulation of lower-level processes (i.e., emotions and behaviors), and they help to

establish connections among the inputs, internal states, and outputs that are needed to achieve specific goals [12]. As such, an individual's EF is important for interacting with a child in a sensitive manner, for regulating one's emotions during challenging situations, and for helping the child do so, as well as for making everyday sound decisions [13, 14]. Parents with higher EF tend to be more warm, sensitive, responsive, and flexible in interactions with their children than those with lower EF [14, 15]; additionally, parents with lower EF tend to be less positive and less capable in managing intense emotions than those with higher EF [10]. Finally, some studies report associations between high parental EF and parental psychological well-being [16–18].

In the context of high-risk parenting, maternal Substance Use Disorder (SUD) is widely recognized as a condition that profoundly interferes with parenting functions and child development [19–22]. More specifically, researchers have suggested that substance addiction exerts a specific impact on parenting, modulating the reward and stress circuits responsible for the neurobehavioral networks of parenting [23]. In the condition of SUD, the reward system is coopted by drugs, with the purpose of maintaining addictive behaviors. In turn, these behaviors become progressively more strongly associated with the relief of stress and negative emotions, making other social stimuli less rewarding [23]. As a consequence, infant stimuli become less salient for parents with SUD and can be instead perceived as stressful, [24], rather than being part of a mutually rewarding system of positive exchanges. Mothers with SUD have been found to interact in less sensitive, more intrusive, and, often, more intensely hostile ways during mother-child interactions, as compared to mothers without this diagnosis [25–28]. In addition, children exposed to substances in utero often present as more irritable and with difficulties with emotion regulation [25, 29], as compared to children who have not been exposed to substances in utero. Such challenging behaviors on the part of the child have the potential to evoke negative emotional reactions within a vulnerable parent and thereby disrupt the predictability and organization typically seen in more healthy relationships [30].

Individuals with SUD often report symptoms in additional areas of psychopathology, suggesting that there is significant comorbidity of substance use with other areas of dysfunction [31, 32]. SUD has been linked with the Anxiety Disorders [33], Major Depressive Disorder [34], Bipolar Disorder [35], and Posttraumatic Stress Disorder [36], as well as sleep disturbance [37] and even suicide attempts [38]. In particular, the comorbidity of SUD and anxiety has been associated with several adverse outcomes, such as increased symptom severity [39] and early relapse to substance use [40]. As suggested by Hser and colleagues [41] the comorbidity of maternal SUD with other mental health disorders may play a critical role in children's developmental outcomes.

It is well-known that the executive functions are involved in the control and regulation of emotional and behavioral processes [12]. Empirical evidence demonstrates that individuals with SUD are more likely to exhibit neuropsychological impairments [20, 42], including impairments in general intelligence and various executive functioning tasks [43], as

well as neural abnormalities in frontal lobes, as indicated by imaging studies [44, 45]. Furthermore, research indicates that parental EF could be transmitted through generations [46, 47]. In this regard, Cuevas and colleagues [48] found an association between the EF of mothers and the EF of their 24-month-olds, highlighting the potential effect of maternal caregiving on the development of children's EF.

Only a few studies have investigated the relation between parental neuropsychological functioning and parenting in individuals with SUD [49, 50]. For example, recent research by Håkansson and colleagues [50] investigated the associations between EF and parental reflective functioning in caregivers with SUD, which includes the caregiver's ability to recognize the child's expressions and behaviors as well as the caregiver's appreciation that the inner world of the child may be affected by the inner world and mental state of the parent. The authors found significant associations between these two domains, suggesting that they may both be essential in sensitive caregiving. This may be because adequate functioning of these domains enhances accurate perception, interpretation, and responsiveness to infant cues [49]. To our knowledge, the current study is the first study to examine the associations between parental neuropsychological functioning and the quality of observed parent-child interactions in the context of parental SUD.

We hypothesize that both parental neuropsychological functioning and psychopathology impact the quality of the emotional availability between mother and child. Emotional Availability (EA) focuses on the capacity of a dyad to create a healthy emotional connection and to share a wide range of affective expressions [51, 52]. As such, it provides a useful theoretical frame for investigating parenting and the quality of adult-child relationships [53–55]. EA emphasizes the "emotional features" of parenting, considering a wide range of adult qualities (i.e., sensitivity, structuring, nonintrusiveness, and nonhostility) and taking also into account the child's contribution (i.e., responsiveness and involvement of the parent [51, 52]). In this way, EA allows observers to simultaneously consider different aspects of relationship quality. A variety of prior studies have already focused on EA in the context of parental SUD [21, 26, 56, 57] and in the presence of adult psychopathology [58]. However, to our knowledge, prior studies have not investigated these aspects while also considering the links with parents' neuropsychological functioning. The present study aims to contribute to the extant literature on parents with SUD by examining how parental neuropsychological functioning and psychopathology impact EA during observed mother-child interactions.

2. Aims and Hypotheses

The purpose of the present study is to adopt an integrated perspective on parenting in the context of parental Substance Use Disorder (SUD) by investigating the way in which maternal neuropsychological functioning and maternal psychopathology could be associated with observed mother-child EA. First, based on the extant literature, we expect to find lower mean scores in mother-child EA in the context of

SUD, as compared to the level of EA observed in normative samples [59]. Second, we hypothesize that, in this group, higher maternal psychopathological symptoms will be associated with lower mother-child EA. Third, we hypothesize that lower maternal neuropsychological functioning will be associated with lower mother-child EA. Finally, we compute a regression model where EA is expected to be predicted by maternal neuropsychological functioning and maternal psychopathology. Our hypothesis is that lower levels in both domains would significantly predict less optimal parenting behaviors.

3. Methods

3.1. Participants. The study involved 29 women diagnosed with SUD (M age = 30.52 years, SD = 7.37) and their children (16 females and 13 males). The mean age of children was 22.97 months (SD = 28.64). The mothers were attending a rehabilitative program in a Venetian Therapeutic Community. This facility offers residential care to mother-child dyads in the context of maternal SUD or other severe psychiatric illness and provides a comprehensive rehabilitation program over a 2-year period. A mother usually enters the facility after a Juvenile Court decree which implies mandatory intervention for the mother, in order not to lose parental responsibility. The community uses a combined intervention program, integrating both therapeutic (group therapy, individual therapy and mother-child intervention) and educational strategies. For the purposes of the present study, only mothers admitted to the facility due to SUD were included in the present analyses. The diagnosis of SUD was made by expert clinicians on the basis of the patients' anamnesis (patient medical history) and of urine toxicology.

At the time of admission, 64% of the women had interrupted their education before attaining upper secondary qualification. Before entering the facility, most of them lived with their partner (65%) or with their family of origin (25%). Regarding past history, 41.4% reported familiar history for SUD, whereas 51.7% reported significant losses and 60.9% reported past experience of maltreatment (sexual or physical abuse). With respect to personal history of SUD, the subjects reported an early onset in their use of drugs (M = 16 years, SD = 2.74), and most self-reported that onset was due to sensation-seeking (44.8%) or to the attempt to escape personal problems (13.8%). Participants mostly described a pattern of poly-drug use (65.52%), with heroin (65.5%), cocaine (6.9%), and cannabis (6.9%) as primary substances of abuse. Also, 48.3% presented symptoms of drug-related illness, such as Hepatitis C. With respect to pregnancy and motherhood, 50% reported that their pregnancy was desired, and 44.8% reported that they continued to use drugs throughout gestation. As for newborn medical status at delivery, mean values were 39 weeks gestational age (SD = 1.41), 3023.21 grams birthweight (SD = 391.39), 33.19 centimeters for cranial circumference (SD = 1.31), and 48.48 centimeters for length (SD = 1.56). Finally, at delivery, 37.9% of infants presented with Neonatal Abstinence Syndrome (NAS).

3.2. Procedures. Data presented in this paper constitutes part of a larger research project approved by the Ethical Committee of the University of Padua. The research protocol was carried out in accordance with the Declaration of Helsinki and with the recommendations of the Code of Ethics approved by the General Assembly of the Italian Association of Psychology. Written informed consent was obtained from mothers prior to the start of any procedures.

Recruitment was initiated after mothers were admitted as patients to the Therapeutic Community. Participation was voluntary and free of charge to the participants. Mothers who agreed to participate underwent an assessment protocol that took place during two one-hour sessions. The assessment included measures aimed at investigating maternal neuropsychological functioning and the presence of psychopathological symptoms. Moreover, mother-child dyads were videotaped during 15 minutes of free-play, and videos were coded using the EA Scales [51].

3.2.1. Maternal Neuropsychological Functioning. Neuropsychological functioning was investigated through the Esame Neuropsicologico Breve-2 [literal translation *Brief Neuropsychological Examination*] (ENB-2; [60]), a comprehensive neuropsychological battery standardized for the Italian population. The battery includes 16 subtests: digit span, immediate and delayed recall prose memory, interference memory at 10 and 30 seconds, trail making test part A and B, token test, word phonemic fluency, abstract reasoning, cognitive estimation, overlapping figures, spontaneous drawing, copy drawing, clock drawing, and ideomotor praxis test. These subtests allow the investigator to assess cognitive domains of attention (trail making test part A and B), memory (digit span, immediate and delayed recall prose memory, and interference memory at 10 and 30 seconds), comprehension (token test), executive functioning (trail making test part B, cognitive estimation, abstract reasoning, phonemic fluency, clock drawing, and overlapping figures), perception (spontaneous drawing, copy drawing), and praxis abilities (ideomotor praxis). The scoring system yields a score for each subtest and to a total score (the Global Cognitive Index (GCI)), describing an individual's overall neuropsychological functioning. The scores can be classified as below average, borderline, and above average, according to established norms. The ENB-2 battery is reported to have good psychometric properties, including adequate test-retest reliability and differential validity in discriminating normative and clinical groups [60, 61]. For the purposes of this study, only the Global Cognitive Index and subtests featuring maternal executive functions (i.e., trail making test-B, cognitive estimation, abstract reasoning, phonemic fluency, clock drawing, and overlapping figures) were considered.

3.2.2. Maternal Psychopathology. The presence of psychopathology in the mother was investigated through the *Symptom Checklist-90 Revised* (SCL-90-R [62]; Italian version by Sarno et al. [63]), a self-report questionnaire designed to evaluate the presence of psychological distress and a range of psychopathological symptoms. The SCL-90-R is composed of 90 items that can be grouped into nine scores along primary

symptom dimensions (somatization, obsessive-compulsive, interpersonal sensitivity, depression, anxiety, hostility, phobic anxiety, paranoid ideation, and psychoticism) and three scores that refer to global distress indexes: global psychological distress status (Global Severity Index (GSI)), the total number of symptoms reported (Positive Symptom Total (PST)), and the intensity of perceived distress (Positive Symptom Distress Index (PSDI)). Raw scores can be converted into *T*-scores that can be compared to norms and that aid the identification of severe symptoms. The SCL-90 is well-established as a reliable and valid measure of psychological problems and symptoms, and it is normed on both clinical and nonclinical populations [62]. For the purposes of this study, all symptom scales and distress indexes were considered at a descriptive level, whereas only the GSI was included in the regression model.

3.2.3. Emotional Availability. The quality of videotaped mother-child interactions was assessed using the *Emotional Availability Scales*—4th ed. (*EA Scales*; [51]). This observational coding system is composed of six scales, four that assess the adult (sensitivity, structuring, nonintrusiveness, and nonhostility) and two that assess the child (responsiveness and involvement). The scales consider both behaviors and emotional expressions that occur during the interaction, and they can be used from infancy into adolescence [51, 52].

The *adult sensitivity* scale assesses the adult's capacity to both express healthy and mostly positive range of emotions and to respond to the child quickly and appropriately. Higher scores on this scale indicate that the adult is generally positive in effect, reads the child's cues accurately, responds to cues in a timely manner, is flexible in responsiveness, and behaves in an accepting way toward the child. The *adult structuring* scale evaluates the adult's ability to effectively guide learning and to set age-appropriate limits. Higher scores indicate that the adult offers preventive guidance, is successful in guiding learning, uses both verbal and nonverbal forms of guidance, and enforces appropriate limits. The *adult nonintrusiveness* scale considers the adult's tendency to follow the child's lead, avoid interfering, and permit age-appropriate autonomy. Higher scores indicate that the adult generally follows the child's lead, enters play when welcome, and avoids physical or verbal interferences. The *adult nonhostility* scale assesses the adult's ability to regulate negative emotions and avoid expressing them toward the child or in the presence of the child. This includes both overt hostility, such as ridiculing or threats of separation, and covert hostility, such as impatience, frustration, or irritation. Higher scores indicate that the adult does not express covert or overt hostility, remains cool under stress, does not express frightening or threatening behaviors, and avoids hostile play themes.

The *child responsiveness* scale assesses the child's tendency to express a healthy range of mostly positive emotions and to respond to the adult in a positive and nonanxious manner. Highly responsive children express mainly positive emotions and are comfortable responding to the adult, yet do not compromise their autonomy. Finally, the *child involvement* scale evaluates the child's tendency to invite the adult into interaction and to engage with the adult. Higher scores on this

scale indicate that the child frequently reaches out to the adult for emotional and playful exchanges, elaborates upon those exchanges, and rarely uses negative means (e.g., whining) to involve.

Each scale is scored directly on semicontinuous 7 point scales, with higher scores being more optimal. The coding refers to the global quality of the interaction observed rather than on specific behaviors. For each scale, scores between 5.5 and 7 suggest a more healthy interaction. Scores around 4 indicate the presence of inconsistency (i.e., behaviors that are appropriate in some way but that are not fully optimal) or for sensitivity and child responsiveness depending scales also some degree of unhealthy overconnectedness. Scores of 3 or below point out less optimal interactions. Scores lower than 2 indicate low qualities on that dimension.

Moreover, the EA system also provides a measure of attachment security through the Emotional Attachment Zones Evaluation (EA-Z; previously referred to as the Emotional Attachment and Emotional Availability Clinical Screener [51]). The EA-Z categorizes each member of the dyad into one of four attachment "zones," which conceptually correspond to the four attachment styles [64, 65]. The zones are Emotionally Available, Complicated, Detached, and Problematic (descriptions are patterned after secure attachments, insecure-resistant attachments, insecure-avoidant attachments, and insecure-disorganized attachments, resp.).

3.3. Statistical Analyses. Data were analyzed using IBM SPSS statistics, Version 23. Preliminary analyses were run using descriptive statistics (average scores, frequencies, and percentages) to investigate maternal neuropsychological functioning, maternal psychopathology, and EA. Subsequently, Pearson's product-moment correlation coefficient was run to test for associations among neuropsychological functioning, psychopathology, and EA, adopting a multiple testing approach. Given the exploratory purposes of the present study no *p* value adjustment was used, based on the theoretical and methodological assumption that, despite decreasing the risk of Type I errors, such a choice would have increased the risk of making type II errors [66]. Moreover, this choice was supported by the fact that, despite separately, the variables considered have already been tested for associations in previous studies. Finally, this choice was supported empirically, given the medium-to-large effect sizes that were found in the results of the present study [67, 68]. Finally, a 2-step hierarchical multiple regression was conducted in order to predict mother-child EA from maternal neuropsychological functioning and maternal psychopathology.

4. Results

4.1. Maternal Neuropsychological Functioning. Table 1 reports average scores, standard deviations, and the distribution among normative cut-offs for the ENB-2 scores. With respect to neuropsychological functioning, a significant percentage of mothers presented an impaired cognitive profile, considering both the ENB-2 Global Cognitive Index and maternal executive functions. Specifically, higher rates of impairments

TABLE 1: Means, SD, and the distribution among normative cut-offs for the ENB-2.

<i>Mothers neuropsychological functioning</i>		
N = 29		
	M (SD)	Impairment N (%)
<i>Executive functions</i>		
Trail making test-B (TMTB)	10.39 (16.12)	11 (37.9)
Cognitive estimation (Cog-Est)	-2.17 (2.96)	18 (62.1)
Abstract reasoning (Ab-Reas)	-.11 (1.47)	7 (24.1)
Phonemic fluency (Ph-Fl)	-.70 (1.06)	10 (34.5)
Clock drawing (Cl-Dr)	-2.78 (4.68)	14 (48.3)
Overlapping figures (Ov-Fig)	-.72 (.99)	6 (20.7)
<i>Global Cognitive Index (GCI)</i>	77.79 (9.13)	10 (34.5)

TABLE 2: Means, SD, and distribution of the subjects in the SCL-90-R.

<i>Mothers' psychopathology</i>		
N = 27		
Variable	M (SD)	Clinical N (%)
Somatization (Som)	51.96 (12.10)	8 (29.6)
Obsessive-compulsive (OC)	50.59 (11.26)	7 (25.9)
Interpersonal sensitivity (IS)	53.22 (11.56)	11 (40.7)
Depression (Dep)	55.67 (10.91)	13 (48.1)
Anxiety (Anx)	54.48 (10.92)	11 (40.7)
Hostility (Hos)	53.56 (11.92)	9 (33.3)
Phobic anxiety (Phob)	50.07 (8.26)	6 (22.2)
Paranoid ideation (Par)	55.56 (13.28)	16 (59.3)
Psychoticism (Psy)	59.04 (11.29)	15 (55.6)
<i>GSI</i>	55.48 (12.39)	13 (48.1)
<i>PST</i>	51.22 (9.15)	11 (40.7)
<i>PSDI</i>	59.81 (12.43)	16 (59.3)

GSI = Global Severity Index, PST = Positive Symptom Total, PSDI = Positive Symptom Distress Index.

were found on the trail making test-B, cognitive estimation, and clock drawing.

4.2. *Maternal Psychopathology.* Table 2 displays average scores, standard deviations, and the distribution among

TABLE 3: Means, SD, and distribution of the dyads on the EA Scales and on the EA-Z.

<i>Emotional Availability Scales (EA Scales)</i>			
N = 29			
<i>Mother scales</i>	M (SD)	<i>Child scales</i>	M (SD)
Sensitivity	3.83 (0.74)	Responsiveness	3.50 (0.76)
Structuring	4.03 (0.46)	Involvement	3.36 (0.99)
Nonintrusiveness	4.09 (1.27)		
Nonhostility	4.79 (1.09)		
<i>Emotional Attachment Zones (EA-Z)</i>			
N = 29			
<i>Mothers zones</i>	N (%)	<i>Child zones</i>	N (%)
Emot. Avail.	2 (6.9%)	Emot. Avail.	-
Complicated	18 (32.7%)	Complicated	14 (48.3%)
Detached	8 (14.5%)	Detached	11 (37.9%)
Problematic	1 (1.8%)	Problematic	4 (13.8%)

normative cut-offs for the SCL-90-R scores. As is shown in Table 2, participants reported the presence of clinically significant symptoms in different areas, such as paranoid ideation, psychoticism, depression, anxiety, and interpersonal sensitivity. Moreover, this sample had high rates of clinically significant symptoms on the global distress indexes.

4.3. *Emotional Availability.* Table 3 shows average scores, standard deviations, and the distribution of the dyads assessed through the EA Scales and the EA Zones (previously EA2-CS). Mean direct scores for each scale ranged from 3.83 to 4.79, which indicates that, as a group, mothers and children in this sample had relatively low EA. This range of scores was consistent with other studies with drug-exposed samples [28], and it was lower than what is typically found in a normative, low risk sample, where mean scores usually range from 4 to 6 [53, 59]. Please note that this is a descriptive rather than a statistical between this SUD sample and the normative samples reported in other studies. Thus, these results lend support to the first hypothesis, which predicted that these mothers would have lower EA compared to normative samples in the literature.

On the EA-Z, most mothers and children were categorized in the complicated (32.7% and 48.3%, resp.) and detached (14.5% and 37.9%) zones of the scoring system. This indicates that, according to the EA-Z, most dyads presented with an insecure attachment style.

4.4. *Correlations among Neuropsychological Functioning, Psychopathology, and EA.* As shown in Table 4, we found statistically significant correlations between maternal neuropsychological functioning and EA, suggesting that women who performed better on the ENB2 also showed higher EA. Specifically, significant associations were found between maternal executive functioning and global cognitive functioning and EA (maternal sensitivity and nonintrusiveness), indicating that mothers with higher neuropsychological functioning present as more sensitive and less intrusive during mother-child interactions. Furthermore, significant associations were

TABLE 4: Correlations among measures of neuropsychological functioning and maternal behaviors.

	EA Sens	EA Struct	EA Nonint	EA Nonhos	EA Ch. Resp	EA Ch. Invol
<i>Executive functions</i>						
TMTB	-.596**	-.188	-.549**	-.542**	-.508**	-.370*
Cog-Est	.104	-.083	-.250	-.153	.034	.019
Ab-Reas	.443*	.031	.183	.359	.337	.147
Ph-Fl	.333	-.020	.351	.221	.234	.248
Cl-Dr	.147	-.026	.416*	.186	.133	.227
Ov-Fig	.119	-.131	.168	.079	.019	.093
GCI	.505**	.082	.393*	.349	.378*	.344

TMTB = trail making test-B, Cog-Est = cognitive estimation, Ab-Reas = abstract reasoning, Ph-Fl = phonemic fluency, Cl-Dr = clock drawing, Ov-Fig = overlapping figures, and GCI = Global Cognitive Index. *Correlation is significant at the 0.05 levels (two-tailed). **Correlation is significant at the 0.01 levels (two-tailed).

TABLE 5: Correlations among symptoms of psychopathology and maternal behaviors.

	EA Sens	EA Struct	EA Nonint	EA Nonhos	EA Ch. Resp	EA Ch. Invol
Som	-.264	.104	-.353	-.302	-.311	-.288
OC	-.446*	-.349	-.275	-.257	-.493**	-.483*
IS	-.329	-.053	-.351	-.136	-.330	-.381*
Dep	-.362	-.276	-.288	-.211	-.397*	-.428*
Anx	-.352	-.045	-.310	-.113	-.264	-.378
Hos	-.232	.220	-.172	-.179	-.123	-.131
Phob	-.444*	-.088	-.210	-.275	-.290	-.238
Par	-.326	-.135	-.296	-.294	-.343	-.368
Psy	-.348	-.218	-.221	-.223	-.333	-.335
GSI	-.469*	-.133	-.377	-.309	-.426*	-.398*
PST	-.367	-.214	-.400*	-.139	-.335	-.431*
PSDI	-.365	.021	-.160	-.313	-.345	-.198

Som = somatization, OC = obsessive-compulsive, IS = interpersonal sensitivity, Dep = depression, Anx = anxiety, Hos = hostility, Phob = phobic anxiety, Par = paranoid ideation, Psy = psychoticism, GSI = Global Severity Index, PST = Positive Symptom Total, and PSDI = Positive Symptom Distress Index. *Correlation is significant at the 0.05 levels (two-tailed). **Correlation is significant at the 0.01 levels (two-tailed).

found between maternal neuropsychological functioning and the child EA Scales during mother-child interactions.

Maternal psychopathology was also significantly correlated with EA (Table 5). Mothers who reported higher distress also showed less optimal behaviors during interactions with their children. Again, among the maternal scales, sensitivity was most consistently related to psychopathological symptoms, especially with the GSI. Maternal psychological distress was significantly correlated with the child EA Scales, with children of mothers who reported higher symptoms on the SCL-90-R showing less optimal responsive and involving behaviors. Finally, maternal neuropsychological functioning and maternal psychopathological symptoms were significantly correlated (Table 6). Specifically, higher maternal psychological distress was associated with poorer performance on the ENB2.

4.5. The Influence of Neuropsychological Functioning and Psychopathology on EA. Given the strong correlations found among the different measures, we ran a regression model to

test the impact of maternal neuropsychological functioning and maternal psychopathology on mother-child EA. A 2-step hierarchical multiple regression (HMR) analysis was conducted including the ENB2 GCI, the SCL-90-R GSI, and EA. Among maternal EA Scales sensitivity was identified as the dependent variable. This choice was due both to the significant bivariate correlations between sensitivity, the ENB2 GCI, and the SCL-90-R GSI and to the fact that, among parental characteristics, sensitivity has been one of the centerpieces of attachment and parent-child interaction research (e.g., [64, 69]). Maternal ENB2 GCI was entered at Step 1 of the regression, and Maternal GSI was entered at Step 2. We included variables of both psychopathology and neuropsychological functioning based on the extant literature highlighting significant associations between these two domains [70]. Table 7 reports regression statistics. The results of the hierarchical multiple regression indicated that, at Step 1, GCI contributed significantly to the prediction of maternal sensitivity $F(1, 25) = 8.62, p = 0.007$, and accounted for 25.60% of the variance in maternal sensitivity.

TABLE 6: Correlations among measures of neuropsychological functioning and psychopathology.

	Som	OC	IS	Dep	Anx	Hos	Phob	Par	Psy	GSI	PST	PSDI
<i>Executive functions</i>	.145	.065	.175	.186	.117	.060	.176	.109	.206	.210	.183	.176
TMTB	.227	.224	.030	.143	.094	.080	.225	.105	.080	.179	.084	.119
Cog-Est	-.093	-.088	-.022	.003	-.111	-.110	-.136	-.216	-.122	-.126	-.040	-.174
Ab-Reas	-.036	-.183	.074	.017	-.017	-.105	-.244	-.047	-.133	-.098	.044	-.127
Ph-Fl	.106	.145	.073	.098	.216	.030	-.061	-.093	.019	.079	.110	.095
Cl-Dr	-.199	-.141	.038	.028	-.047	-.099	-.064	-.174	-.056	-.112	.007	-.133
Ov-Fig	-.129	-.199	-.207	-.223	-.171	-.309*	-.280*	-.257	-.273*	-.291*	-.204	-.213
GCI	-.229	-.211	-.084	-.160	-.180	-.185	-.325*	-.227	-.250	-.272*	-.125	-.243

TMTB = trail making test-B, Cog-Est = cognitive estimation, Ab-Reas = abstract reasoning, Ph-Fl = phonemic fluency, Cl-Dr = clock drawing, Ov-Fig = overlapping figures, GCI = Global Cognitive Index, Som = somatization, OC = obsessive-compulsive, IS = interpersonal sensitivity, Dep = depression, Anx = anxiety, Hos = hostility, Phob = phobic anxiety, Par = paranoid ideation, Psy = psychoticism, GSI = Global Severity Index, PST = Positive Symptom Total, and PSDI = Positive Symptom Distress Index. * Correlation is significant at the 0.05 levels (two-tailed).

TABLE 7: HMR testing relations among maternal cognitive functioning, psychopathology, and EA.

Variable	Maternal sensitivity						
	<i>B</i>	<i>SE B</i>	β	<i>t</i>	ΔR^2	ΔF	Sig. ΔF
Step 1							
ENB2 GCI	.041	.01	.506	2.94	.256	8.62	.007
Step 2							
ENB2 GCI	.031	.01	.382	2.13	.087	3.20	.086
SCL-90 GSI	-.020	.01	-.321	-1.79			

This indicates that mothers with higher scores on the GCI also showed higher sensitivity during interactions. Introducing the SCL-90 GSI explained an additional 8.7% of the variance in maternal sensitivity. Although the second model resulted in effectively explaining the variance in maternal sensitivity, $F(2, 24) = 6.29, p = 0.006$, the change in R^2 subsequent to the introduction of the SCL-90 GSI was only marginally significant, $\Delta F(1, 24) = 3.20, p = 0.086$, suggesting that most of the variance in maternal sensitivity was explained by maternal neuropsychological functioning. Thus, mothers who reported higher general distress tended to show lower sensitivity. Together, the two independent variables accounted for the 34.4% of the variance in maternal sensitivity.

5. Discussion

The purpose of the present study was to contribute to the extant literature on parenting in the context of SUD, a condition identified as highly risky both for the mother and for the child [19, 21, 22, 26, 27]. Drawing on empirical evidence that highlights the influences of both parental cognitive functioning and psychopathology on observed caregiving behaviors, we proposed an integrated perspective and investigated the way in which maternal neuropsychological functioning and maternal psychopathology were associated with the quality of parent-child relationships [51–53, 55]. More specifically, we investigated these aspects in a group of mothers affected by SUD and their children, hypothesizing to find generally low neuropsychological functioning, high psychopathological symptoms, and low quality mother-child interactions

(measured through EA), as well as significant associations between these different domains. As previously highlighted by the literature on parental SUD [71], the participants often reported traumatic histories, characterized by maltreatment, and sexual and/or physical abuse, as well as family histories of SUD. An early onset in the consumption of drugs was described, with frequent patterns of poly-drug use that often continued during pregnancy, leading on some occasions to neonatal adverse consequences at delivery [72].

As hypothesized, significant impairments in maternal neuropsychological functioning were uncovered, with scores that were below the norm on executive functions and overall cognitive profiles, similar to the work of Parolin and colleagues [73] on young adults with SUD. Furthermore, these mothers frequently reported the experience of clinically significant symptoms, in line with previous studies highlighting the presence of higher rates of psychopathology in individuals with SUD [74]. Finally, the dyads in our sample presented with relatively low EA, with average scores around 3 and 4. This indicates the presence of inconsistency and distress during interactions, as well as detachment. Although this result could not be further investigated through statistical analyses, due to the lack of a control group, it is consistent with previous studies [26, 28] that compared mother-child EA in the context of SUD with normative samples. Strikingly, not one of the children in our study was coded as Emotionally Available on the EA-Z, stressing the importance of interventions to help these families [75, 76].

As hypothesized, significant associations were found between maternal EA, maternal neuropsychological functioning, and psychopathology. The strongest associations

were found between maternal sensitivity, nonintrusiveness, executive functions, and the Global Cognitive Index, suggesting that mothers who presented with globally higher neuropsychological functioning also demonstrated more sensitive and less intrusive behaviors during mother-child interactions. These links were found especially with ENB2 subtests investigating attention and task switching (trail making test-B), the individual's capacity to answer ambiguous questions drawing from general knowledge of the world (cognitive estimation), and the adequacy of representational, planning, organizational, and coordination abilities (clock drawing). We speculate that these same abilities might be involved in parent-child interactions. To be sensitive to a child's cues, mothers are required to be mentally flexible and to continuously maintain, switch, and update attention on different sources of information. Moreover, mothers are required to mentally represent their child's signals and needs; to disambiguate when needs are not clear; and to plan, organize, and coordinate their responses to the child's cues and behaviors. A deficit in one or more of these abilities could compromise the parent's capacity to be adequately sensitive and responsive to the child's signals. At the same time, similar impairments in these same areas, such as the lack of mental flexibility and difficulties in planning, organizing, and coordinating behavioral responses, as well as the impossibility to update these responses on the basis of the child's feedback (e.g., a child's protest for being interrupted during the ongoing of an activity might lead to parental intrusiveness).

Consistent with our hypotheses and with previous findings [58], EA was also correlated with maternal psychopathology, with those reporting higher distress also showing less optimal parenting behaviors and less optimal interactions with their children. Finally, significant correlations were found between maternal neuropsychological functioning and psychopathological symptoms. These correlational findings were additionally supported by the regression model. Interestingly, most of the variance of maternal sensitivity in our study was explained by maternal neuropsychological functioning and only marginally by maternal psychopathology, suggesting the possibility that, in the case of parental SUD, cognitive impairments might have a higher predictive value on actual caregiving behaviors.

Limitations. The first limitation of this study involves the small number of participants, which prevents us from the generalization of the obtained results. Future studies should include a larger number of participants, in order to be able to replicate and further expand the results of the present study. The second limitation involves the lack of a control group. Future research should investigate these questions in normative samples, which are usually characterized by lower rates of cognitive impairments, psychological distress, and higher quality of maternal EA. A third limitation concerns the lack of measures specifically focused on children's executive functioning and psychopathology. The literature has highlighted the fact that experienced parenting behaviors could be associated with the development of children's executive functions (e.g., [46]), suggesting an intergenerational

transmission of cognitive processes [13]. Moreover, some studies have highlighted the significant associations existing between the experience of poor-quality parenting and the development of psychopathological symptoms in children. Given that, in our study, we found significant associations between both of these parental measures and children's EA; it would be interesting in the future to explore this aspect, also investigating the impact of parental functioning on children's neuropsychological processes and psychopathology.

Future Directions. Future research with larger sample sizes and several time points of measurements could investigate mediational models. For example, we wonder whether there is a pathway from psychological distress to substance abuse (as a self-medication strategy), and then to subsequent neuropsychological impairments (due to persistent drug use) [73, 77]. A different pathway could be from impairments in maternal neuropsychological functioning to impairments in other social/emotional processes that are supported by neurocognitive abilities to some extent (such as empathy), which then may contribute to difficulties in mother-child interactions. For example, a study from Killeen and Teti [78] showed that EA was related to the mother's empathetic response to infant emotional expressions, measured by the activation of her right frontal lobe. Given that the frontal lobes are associated with executive functioning and are impaired in those with SUD [44, 45]. It may be interesting to examine how executive functioning could contribute to lower empathy and difficulties in adequately responding to the child's signals. Studies with larger sample sizes and multiple times points can more closely examine these trajectories in order to extend our understanding of these phenomena as well as help identify areas of prevention and intervention for parents at risk for SUD.

6. Conclusions

Parental SUD has been widely linked to dysfunctions in parenting behaviors and parent-child interactions. Furthermore, empirical evidence has highlighted that individuals with SUD often show impairments in neuropsychological functioning and psychological well-being, features which have been previously linked to difficulties in parenting and poor-quality parent-child interactions. To our knowledge, no prior study has examined the links between maternal neuropsychological functioning, psychopathology, and quality of observed EA in this clinical population. To address this gap in the literature, we investigated in a group of mothers with SUD the associations between maternal neuropsychological functioning, maternal psychopathology, and EA, with findings of cognitive/neurological functioning being associated with EA, and to a much lesser extent, with maternal psychopathology being associated with EA. From a clinical point of view, this study leads to important considerations about prevention and clinical interventions for parents with SUD. This clinical group has been previously identified as difficult to treat, especially given the profound impact of drugs on physical, cognitive, and emotional functioning. Herein, we propose an integrated approach that targets different facets of

functioning (neuropsychological, mental health, and parent-child relationships). These findings indicate that for parents with SUD, in addition to traditional treatment for addiction and for mental health, it may be critical to target and to improve parent-child EA, which may help to strengthen a mutually rewarding attachment system that challenges the attachment of the mother to drugs, and potentially prevent relapse. Our integrated perspective further considers also the treatment of maternal neuropsychological functioning, with hopes that improvements in cognitive profiles might help to support additional improvements in parenting behaviors. These joint efforts are likely to support not only parental but also child well-being and the well-being of future children for women who have problems with substance use.

Data Availability

Data will be available upon request.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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Research Article

Pathological Internet Use—An Important Comorbidity in Child and Adolescent Psychiatry: Prevalence and Correlation Patterns in a Naturalistic Sample of Adolescent Inpatients

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Background. Few studies have examined the prevalence of problematic internet use (PIU) in young people undergoing inpatient treatment in child and adolescent psychiatry centers. The aims of our study were thus (a) to assess the frequency of comorbid PIU in a sample of adolescent psychiatric inpatients and compare it with a control group of nonreferred adolescents and (b) to gain insights into correlations between PIU and psychiatric comorbidities. **Methods.** 111 child and adolescent psychiatry inpatients (CAP-IP, mean age 15.1 ± 1.4 years; female : male 72.4% : 27.6%) undergoing routine psychodiagnostics were screened for the presence of PIU. The widely used Compulsive Internet Use Scale (CIUS) was chosen for this purpose. Prevalence rates of PIU were then compared to matched nonreferred control subjects from a school sample. Additionally, comorbidities of inpatients with PIU were compared to inpatients without PIU. **Results.** Our inpatient sample showed a much higher prevalence of PIU than that found in previous populational samples of young people. Compared with a matched school sample, addictive internet use was 7.8 times higher and problematic internet use 3.3 times higher among our adolescent sample. PIU was significantly associated with characteristic patterns of psychopathology, that is, suicidality, difficulties in establishing stable and consolidated identity, and peer victimization. **Conclusion.** PIU among adolescents undergoing inpatient psychiatric treatment is much more frequent than among their peers in the general population and is associated with specific patterns of psychopathology.

1. Introduction

The use of the internet and related digital media has grown exponentially worldwide in recent years. Indeed, in mid-2016, a penetration rate of almost half of the world's population was recorded. This translates into a worldwide growth rate of more than 900% from 2010 to 2016. The fastest growing region was found to be the European Union, where in 2016, nearly 80% of the overall population was using the internet [1].

While this trend has been observed in all age groups, adolescents, in particular, adopt new technologies quickly. Virtually 100% of German-speaking adolescents use the internet on a daily basis, more than 80% use it on the go, and more than 50% consider it “indispensable” [2, 3]. Access to relevant technologies has become a precondition for educational and occupational advancement; thus, internet “abstinence” is not an option for the majority of youth today [2, 4].

For the past 20 years, the rising significance of the internet and associated media has stimulated debate about dysregulated or problematic use of the internet (PIU) among young people [5, 6] and about whether such dysfunctional patterns affect somatic health and psychosocial wellbeing [7].

From a pathophysiological point of view, PIU has been understood as an impulse control disorder that is best classified within the group of behavioral addictions. Despite a growing body of scientific evidence for this taxonomy [8–17], only “Internet Gaming Disorder (IGD)” —that is, the excessive use of online computer games, leading to functional impairment and distress—was included in Section III of the DSM-5 as a “condition that requires further study” [18].

Given the diversity of diagnostic assessment methods [19, 20], it is unsurprising that PIU prevalence figures vary substantially. The only meta-analysis to date included 80 studies with nearly 90,000 participants and a mean age of

18.4 years. The authors found mean worldwide prevalence of 6% for PIU, with the European subsample showing 4.35% [21]. In recent years, studies based on large representative samples of the European adolescent population have found PIU prevalence rates of 1.2–4.4% [4, 22–24]. Müller et al. investigated the occurrence of the proposed DSM-5 criteria for Internet Gaming Disorder (IGD) [18] in a large sample of more than 10,000 European adolescents, finding a prevalence of 1.6% [25]. In a representative sample of German adolescents, criteria for IGD were found in 1.16% of the study participants [26].

Our study used the Compulsive Internet Use Scale (CIUS), which has already been applied by several other investigations of German-speaking adolescents, yielding results comparable to ours. Rumpf et al. [27] found PIU to be prevalent in 2.4% of young people aged 14–24 years and in 4.0% of adolescents aged 14–16. In a second study, the authors found a prevalence rate of 3.2% in German adolescents aged 14–17 [24]. The only Austrian study to date using the CIUS [2] showed PIU to be prevalent in 3.3% of the sample ($n = 398$, mean age = 15.2 years). This school sample was used in the present study as a point of reference.

A growing body of evidence indicates that PIU is associated with a broad spectrum of somatic and psychosocial problems as well as with psychiatric comorbidity. Research on the negative somatic effects of excessive internet use in adolescents has found sleeping problems [8, 28–32], overweight [29, 33–35], poor nutrition [8, 36], and back and musculoskeletal issues [28]. With respect to psychosocial behavior, there is evidence that dysregulated internet use is associated with tobacco use [8], less time spent with real-life peers [37] and physical inactivity, or sedentary lifestyle [8, 38]. PIU has also been associated with self-destructive behavior in adolescents [9]. Two meta-analyses on internet addiction and psychiatric comorbidities in adolescents and adults showed comparable results. In these studies, PIU was associated with symptoms of ADHD, alcohol abuse, depression and anxiety, hostility and aggression, and obsessive-compulsive symptoms [39, 40]. In their large-scale and cross-national study on European adolescents ($n = 11,356$, mean age 14.9 years), Kaess et al. demonstrated that PIU in adolescents significantly correlated with suicidal behavior, depression, anxiety, conduct problems, and symptoms of ADHD [9]. The authors thus conclude that assessing PIU could be helpful for early detection and intervention in cases of suicidal ideation and psychopathology in adolescents. A close association between suicidality and PIU has also been reported by other studies [8, 41, 42].

In light of these findings, it is certainly worth exploring why PIU seems to play a role in such a broad spectrum of internalizing and externalizing psychopathology. In the case of internalizing comorbidity, PIU might be a “digital expression” or form of “digital compensation” of classical psychopathology symptoms, such as loss of enjoyable activities, loss of engagement with real-life people, social withdrawal, escapism, avoidance, loss of life satisfaction, and suicidality. In the case of externalizing comorbidity, the impulse control domain of disorders such as ADHD, borderline personality disorder, and NSSI may contribute to the association between

these entities and PIU. The association between substance-use disorders and PIU is not surprising, given that they share pathophysiological mechanisms [12, 13, 16, 17]. It is important to emphasize that a potential causal relationship between PIU and psychiatric comorbidity is not yet clear because findings have primarily been based on cross-sectional data. Thus, conclusions on cause and effect cannot yet be drawn.

In adolescence, young people increasingly begin to establish social networks outside of the core family, and psychosocial development is strongly influenced by extrafamilial peers. The internet and social networking sites (SNS) can be an important and useful tool for young people to develop and experiment with relationships and social capital [43]. On the other hand, there is some evidence that in adolescents, intensive SNS use may be associated with poor psychological functioning, poor mental health, and suicidality, especially in the presence of cyberbullying [44, 45]. Instability in interpersonal relationships and problems with identity and ego strength may play a mediating role, but to our knowledge, this hypothesis has not yet been tested in studies.

Taken together, the “complex interaction between various aetiological factors” [40] and the ubiquitous availability of relevant technologies may have led to the high prevalence of PIU and associated psychopathology in adolescent populational samples. In recent European studies, PIU and associated psychopathology cases were equally distributed among male and female adolescents, in contrast to previous findings and popular belief [8].

Most findings on the comorbidity of PIU and psychiatric diagnoses in youth have been gathered in nonclinical samples. Few studies have examined adolescents undergoing inpatient psychiatric treatment. Müller et al. screened a sample of 81 juvenile patients and found a high prevalence of PIU, 11.3%, as well as an association with internalizing disorders such as anxiety and depression [46]. In another study, a sample of 60 referred adolescents with diagnosed PIU was screened for the presence of comorbid psychiatric disorders. The most common conditions found were ADHD, social phobia, and major depressive disorder [47].

To our knowledge, no study to date has directly compared the prevalence of PIU in adolescents undergoing inpatient CAP treatment with a matched control group of nonreferred peers using the same diagnostic instrument. The present study was thus conducted to test the following two hypotheses:

(1) Adolescents undergoing inpatient psychiatric treatment will show different rates of dysfunctional internet use (addictive internet use and problematic internet use) from a control group of nonreferred peers. Null hypothesis: the groups will not differ in terms of internet use.

(2) A group comparison of adolescent inpatients with dysfunctional internet use (addictive internet use and problematic internet use) and inpatients with normal use will show differences concerning additional clinical variables. Null hypothesis: the groups will not differ statistically in terms of other psychopathology.

2. Materials and Methods

2.1. Sample and Procedure. We analyzed data from inpatients treated in the Department of Child and Adolescent

Psychiatry, Medical University of Innsbruck, between 2013 and 2017. The Department of Child and Adolescent Psychiatry is a specialized facility with a public service mandate for the Austrian federal state of Tyrol. It is the only hospital in the state with inpatient services for minors with mental health problems.

As part of a routine diagnostic battery, patients completed the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II), the Youth Self-Report (YSR), and the Assessment of Identity Development in Adolescence (AIDA). A parent or legal guardian completed the Child Behavior Checklist (CBCL). Sociodemographic data was also collected at the beginning of inpatient treatment. For the purposes of this study, the Compulsive Internet Use Scale (CIUS) was added to assess PIU. The primary psychiatric diagnosis was extracted from electronic patient records.

Inclusion criteria were (a) minimum age of 12 years, (b) undergoing inpatient treatment in the Department of Child and Adolescent Psychiatry (Innsbruck), and (c) written declaration of consent. Exclusion criteria were (a) age below 12 years and (b) diagnosis of severe mental retardation or florid psychopathological symptoms (e.g., psychosis or intoxication), which would have made the completion of the questionnaires unfeasible. All patients and their parents or legal guardians signed an informed consent form for the scientific use of data. The study was approved by the Ethics Committee of the Medical University of Innsbruck and was performed according to the Declaration of Helsinki 1995 (as revised in Edinburgh in 2000).

2.2. Measurement

2.2.1. CIUS. The Compulsive Internet Use Scale (CIUS) is a widely used self-report questionnaire with 14 items. It was developed to assess addictive internet use, on the basis of the criteria for substance dependence and pathological gambling in the Diagnostic and Statistical Manual of Mental Disorders, 4th Edition [48]. The 14 questions are answered on a 5-point Likert scale, resulting in a sum score between 0 and 56 points. A cut-off of 28 points identifies *pathological or addictive internet use* [49], while a cut-off of 21 points identifies a subthreshold level of *problematic internet use* [50]. The 14 items of the CIUS measure five subscales: loss of control, preoccupation, conflict, withdrawal symptoms, and coping. The CIUS has been validated in several languages, including German [51]. Good external and factorial validity as well as good reliability indices were reported for the questionnaire in samples of heavy internet users (Cronbach $\alpha = 0.89-0.90$) and normative samples ($\alpha = 0.90$) [49].

2.2.2. Assessment of Identity Development in Adolescence (AIDA). The Assessment of Identity Development in Adolescence (AIDA) self-report questionnaire was developed to measure fundamental subdomains of juvenile identity development. The instrument can distinguish between stable and consolidated identity at one end and identity diffusion at the other [52]. Identity diffusion is considered one of the core elements of borderline personality organization, but it is also part of the section "Criterion A: Level of Personality

Functioning" of the alternative DSM-5 model for personality disorders [18]. The 58 items of the AIDA are summed up to a total score (extent of identity diffusion), which can also be divided into two subscales, discontinuity and incoherence. The instrument shows good reliability in total score (diffusion: $\alpha = .94$), scale (discontinuity: $\alpha = .86$; incoherence: $\alpha = .92$), and subscale ($\alpha = .73-.86$) as well as good validity [52-54].

2.2.3. SCID-II. The Structured Clinical Interview for DSM-IV Disorders (SCID) is the official diagnostic instrument of the American Psychiatric Association (APA) for the assessment of psychiatric disorders via clinical interview. To diagnose personality disorders, the Structured Clinical Interview for DSM-IV Axis II Disorders (SCID-II) is used, which is available in German [55]. The German version is considered appropriate for the diagnosis of personality disorders in adolescence [56]. SCID-II consists of a self-report questionnaire followed by a clinical interview. Each part is scored as 0 (absent), 2 (subclinical), or 3 (present). Our calculations were based on the mean dimensional score (ranging from 0-3) of the three personality disorder clusters A, B, and C.

2.2.4. CBCL and YSR. The Child Behavior Checklist (CBCL) and the corresponding Youth Self-Report (YSR) are among the most widely used instruments to assess mental health in minors [57]. Both instruments have been translated into more than 50 languages, and German versions have been available for approx. 20 years [58]. The CBCL features eight problem syndrome scales that can be combined into the broadband scales "Internalizing Behavior Problems" (Anxious/Depressed, Withdrawn/Depressed, Somatic Complaints), "Externalizing Behavior Problems" (Rule-Breaking Behavior, Aggressive Behavior), and "Mixed Problems" (Social Problems, Thought Problems, Attention Problems). A total behavior problems score (TOT) can also be calculated. Significant discrepancy between youth-reported and parent-reported psychopathology is a well-known phenomenon worldwide, being also evident in studies of large German samples [59]. For the CBCL and its subscales, good reliability ($r > .86$) and validity indices have been reported [57], with reliability indices for the YSR-subscales reported as sufficient ($r > .70$) [57].

2.2.5. Primary Psychiatric Diagnosis. Electronic patient records were evaluated, extracting the primary psychiatric diagnosis according to ICD-10 [60]. For some calculations, we grouped inpatient diagnoses into the broader categories "internalizing disorders" (affective disorders and anxiety disorders) and "externalizing disorders" (hyperkinetic disorders and conduct disorders), which is common practice in child and adolescent psychiatry [61].

2.2.6. (Cyber)bullying. As part of the routine clinical examination, patients were asked whether they had been bullied online or offline, and whether they were active bullies online or offline themselves. The total number of instances (being bullied online/offline, active bullying online/offline) was assessed for this study.

2.2.7. Control Sample. To compare CAP-IP with nonreferred youth, we analyzed the data from a school sample from a previously published study [2]. This allowed us to compare two groups examined in the same state with the same instrument. The groups were matched for age and gender.

2.3. Statistical Procedures. Sample characteristics are given as frequencies, ranges, means, and standard deviations. IBM SPSS (version 22.0) was used for statistical analysis.

To compare the CIUS values of the inpatient sample with the control sample, independent sample *t*-tests and effect sizes (Cohen's *d*) were calculated. The odds ratio was estimated through binary logistic regression. Group differences were calculated for the overall samples and for age- and gender-matched comparisons. Twin-matching was conducted using the propensity score matching procedure.

The psychopathology of inpatients with PIU was compared to inpatients without PIU. Group comparisons were conducted using the chi-squared test or Fisher's exact test for nominal data and analyses of variance with sex as a covariate (ANCOVA) for interval data. Cohen's *d* was used to evaluate the effect sizes of the mean differences.

To investigate differences in internet use between the two groups, one-way analyses of variance (ANOVAs) with Bonferroni correction for post hoc comparison were calculated.

3. Results

3.1. Sample. Initially, 112 patients were included in this study. One patient was excluded due to missing CIUS data, thus yielding a final sample of 111 patients. The mean age was 15.1 (SD: 1.4) years, and the majority of patients were female (74.8%). 72.1% were still attending school, and about half of the sample were from families with separated or divorced parents. The majority of the patients had been diagnosed with an internalizing disorder (61.3%). About a fourth of the sample had previously tried to commit suicide, and 40.5% of the patients had had at least one episode of self-injury (see Table 1 for details).

Patients reported a mean score of 61.4 (SD: 26.8) on the YSR. 73.0% of the sample reported values above the clinical cut-off, with no gender differences (female: 73.0% versus male: 73.1%; $\chi^2 = 0.01$, $p = 0.99$). The large majority of the patients' parents (90.0%) described their children as being significantly distressed; the mean CBCL score was 58.5 (SD: 26.0).

As to PIU, the patients had mean values of 14.8 (SD: 13.8) on the CIUS, with 28.8% reporting values above the cut-off (8.1% problematic internet use, 20.7% addictive internet use). In terms of the subscales of the CIUS, mean values were the highest on the coping subscale and the lowest on withdrawal symptoms.

3.2. Comparison of the Clinical Sample with a Sample of Non-referred Youth (School Sample). To test our first hypothesis, we compared our clinical sample to a previously published sample of nonreferred adolescents (school sample, $n = 398$, mean age 15.2 ± 2.3 , 34.2% female; see [2]). Based on CIUS

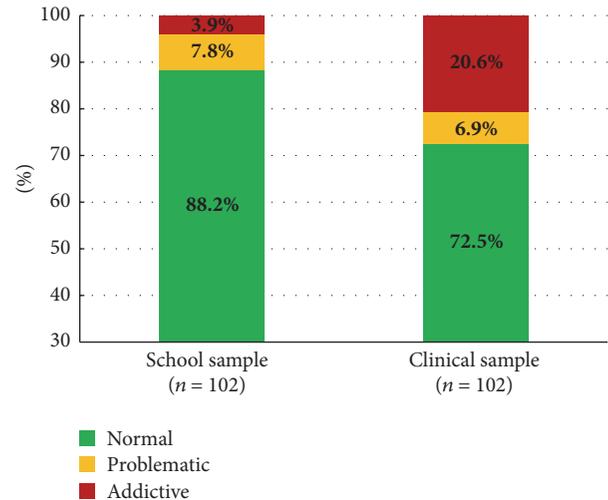


FIGURE 1: Internet usage (CIUS): comparison of school sample and clinical sample, age- and gender-matched ($n = 204$).

cut-off scores, we categorized the two samples into *normal users*, *problematic users*, and *pathological users*.

The results (see Table 2 and Figure 1) show that our patients reported significantly higher CIUS total values than the adolescents in the control sample (14.8 versus 11.2), with an effect size of $d = 0.32$. Addictive internet use (20.7% versus 3.4%; odds ratio: 7.0) and problematic internet use (28.8% versus 11.0%; odds ratio: 3.9) were significantly more prevalent in the clinical sample than in the control sample.

After twin-matching (age and gender) the two groups, there was still a significant difference between patients and control group: among inpatients, the probability (OR) of addictive internet use was 7.8 times higher and the probability of problematic internet use 3.3 times higher than their adolescent peers in the community (see Figure 1).

Our results therefore indicate that the null hypothesis may be rejected, as adolescents undergoing inpatient psychiatric treatment showed significantly higher rates of dysfunctional internet use (addictive internet use and problematic internet use) than a control group of nonreferred peers.

3.3. Analysis of the Clinical Sample: PIU versus Non-PIU. To test the second hypothesis, we divided the clinical sample into normal users (non-PIU, 71.2%, $n = 79$) and pathological or problematic users (PIU, 28.8%, $n = 32$) based on CIUS cut-off scores. The PIU group consisted of users with *pathological* or *addictive internet use* (cut-off: 28 points) and a subthreshold group with *problematic internet use* (cut-off: 21 points). All inpatients with a CIUS value below 21 points were considered *normal users*.

3.3.1. Sociodemographic Data. Neither age nor family status was significantly associated with the incidence of PIU. Male patients showed higher prevalence rates of PIU (39.3% versus 25.3%), but this difference was not statistically significant ($p = 0.23$, see Table 3).

TABLE 1: Sample characteristics.

Mean age (SD), range	15.1 (1.4)	12–17
Gender		
Male	32	25.2%
Female	83	74.8%
Occupation		
In school	80	72.1%
Apprenticeship	11	9.9%
Other	20	18.0%
Family status		
Parents together	50	45.0%
Parents separated/divorced	55	49.5%
One or both parents deceased	4	3.6%
Data missing	2	1.8%
Psychiatric main diagnosis		
Internalizing disorder (F3, F4, F93)	68	61.3%
Externalizing disorder (F90–F92)	12	10.8%
Eating disorder (F66, F50)	28	25.2%
Other (esp. F1, F98)	3	2.7%
History of suicide attempt	26	23.4%
History of nonsuicidal self-injury	45	40.5%

TABLE 2: Problematic and pathological internet use: comparison of the clinical sample with a sample of nonreferred youth (school sample).

	Clinical sample (<i>n</i> = 111)		School sample (<i>n</i> = 389)		Cohen's <i>d</i>	<i>t</i> value	<i>p</i> value
	Mean	SD	Mean	SD			
CIUS	14.78	13.75	11.15	8.0	0.32	6.43	<0.001
		%		%	Odds Ratio	95% CI	<i>p</i>
Problematic internet use		28.8%		11.0%	3.9	2.3–6.3	<0.001
Pathological internet use		20.7%		3.4%	7.0	3.7–13.3	<0.001

3.3.2. *Clinical Data.* Patients with PIU showed significantly more suicide attempts than patients without PIU (46.9% versus 13.9%; $p < 0.001$). With regard to clinical diagnosis, patients with PIU showed more internalizing disorders (71% versus 57%), but this difference was not statistically significant. A small but statistically not significant difference was also found for NSSI, with patients with PIU showing higher rates (46.9% versus 38%; see Table 4).

3.3.3. *Psychometric Data (AIDA, SCID-II, YSR, CBCL).* Patients with PIU reported a mean score of 123.6 points on the AIDA total score, which was significantly higher than the mean score of patients without PIU (104.1; $p = 0.005$, $d = 0.5$), representing a moderate effect size. The analysis of the two subscales showed that patients with PIU had significantly higher scores on both the coherence subscale (68.1 versus 56.1; $p = 0.004$, $d = 0.5$) and the discontinuity subscale (55.5 versus 48.0; $p = 0.021$, see Table 5).

The SCID-II showed a significant group difference between PIU and non-PIU for cluster B personality disorders ($p = 0.036$, $d = 0.5$), whereas there was no significant group difference for cluster A or cluster C (see Table 5).

While patients with PIU reported significantly higher scores for attention problems than those without PIU (YSR: 8.8 versus 6.8; $p = 0.043$, $d = 0.5$), the ratings of parents of patients with PIU differed only on the withdrawn/depressed subscale (CBCL: 9.4 versus 6.9; $p = 0.001$, $d = 0.8$). All other subscales and broadband scales of the YSR and CBCL as well as the total behavior problems score (TOT) showed no statistically significant difference between patients with and without PIU (see Table 5).

3.3.4. *Peer Victimization.* Patients with PIU reported significantly more instances of being bullied than patients without PIU, both offline (12.8 versus 7.0, $p = 0.002$, $d = 0.7$) and online (2.9 versus 0.9, $p = 0.002$, $d = 0.8$). Only 9 patients in the total sample (7.8%) stated that they had actively bullied other people offline. In our sample, there was no group difference between PIU and non-PIU patients regarding active online or offline bullying (see Table 6).

Our results indicate that for the second hypothesis, the null hypothesis may also be rejected: in terms of other psychopathology, we found significant differences between adolescent inpatients with dysfunctional internet use (addictive

TABLE 3: Sociodemographic data.

	Non- PIU Mean (SD)	PIU Mean (SD)	χ^2/t value	<i>p</i> value
Age	15.2 (1.4)	14.8 (1.5)	1.09	0.28
Family status				
Parents together	34 (43.6%)	16 (51.6%)	1.94	0.38
Parents separated/divorced	40 (51.3%)	15 (48.4%)		
One or both parents deceased	4 (5.1%)	0 (0.0%)		
Gender				
Female	62 (74.7%)	21 (25.3%)	1.99	0.23
Male	17 (60.7%)	11 (39.3%)		

TABLE 4: Clinical data.

	Non-PIU (<i>n</i> = 79)	PIU (<i>n</i> = 32)	χ^2/t value	<i>p</i> value
Psychiatric main diagnosis			4.56	0.10
Externalizing disorder	45 (8.9%)	23 (15.6%)		
Internalizing disorder	7 (57.0%)	5 (71.9%)		
Eating disorder	24 (30.4%)	4 (12.5%)		
History of suicide attempt	11 (13.9%)	15 (46.9%)	13.78	<0.001
Nonsuicidal self-injury (NSSI)	30 (38.0%)	15 (46.9%)	0.75	0.39

TABLE 5: Psychometric data.

	Non-PIU (<i>n</i> = 79)		PIU (<i>n</i> = 32)		Effect size	<i>F</i> value	<i>p</i> *
	Mean	(SD)	Mean	(SD)			
AIDA							
Diffusion (total score)	104.1	(40.4)	123.6	(41.1)	0.5	8.25	0.005
Discontinuity	48.0	(17.2)	55.5	(19.8)	0.4	5.48	0.021
Incoherence	56.1	(25.3)	68.1	(25.1)	0.5	8.62	0.004
SCID-II (dimensional scores)							
PD cluster A	1.18	(0.19)	1.26	(0.22)	0.4	3.04	0.084
PD cluster B	1.17	(0.13)	1.25	(0.20)	0.5	4.5	0.036
PD cluster C	1.39	(0.27)	1.42	(0.28)	0.1	0.55	0.58
YSR and CBCL (scales with significant group differences shown)							
YSR							
Attention problems (score)	6.8	(3.9)	8.8	(4.3)	0.5	4.20	0.043
YSR TOT	59.7	(27.2)	66.3	(25.3)	0.2	2.24	0.138
CBCL							
Withdrawn/depressed	6.9	(3.2)	9.4	(3.2)	0.8	13.92	0.001
CBCL TOT	57.9	(27.5)	60.6	(20.3)	0.1	0.97	0.329

*p** : all *p* values after controlling for gender.

TABLE 6: Peer victimization.

Number of experiences of being bullied or of active bullying	Non-PIU		PIU		Effect size	<i>t</i>	<i>p</i> *
	Mean	(SD)	Mean	(SD)			
Being bullied offline	7.0	(8.5)	12.8	(9.9)	0.7	10.65	0.002
Being bullied online	0.9	(1.5)	2.1	(2.9)	0.8	9.84	0.002
Active bullying offline	0.05	(0.2)	0.2	(0.4)	0.3	2.42	0.123
Active bullying online	0.2	(0.8)	0.7	(1.3)	0.7	3.29	0.073

*p** : all *p* values after controlling for gender.

internet use and problematic internet use) and inpatients with normal use.

4. Discussion

Our study sought to address two issues: first, whether the prevalence of comorbid PIU in a naturalistic sample of inpatients in a specialized center for child and adolescent psychiatry would differ from a control group of nonreferred adolescents; second, whether adolescent inpatients with dysfunctional internet use and inpatients with normal use show differences concerning other psychopathology.

As the data show, the prevalence of addictive internet use (20.7% versus 3.4%; odds ratio: 7.0) and problematic internet use (28.8% versus 11.0%; odds ratio: 3.9) was significantly higher in the clinical sample than in the control sample, thus confirming the first hypothesis. The differences remained stable after twin-matching the two samples. As described in detail in a previous publication of our group [2], prevalence rates of addictive and problematic internet use in the school sample show high consistency with European large-scale studies [4, 22–24, 27]. This may be indicative of the representativeness of our control sample and of the broader generalizability of our findings. To our knowledge, only one other study [46] has examined addictive internet use as a comorbid disorder among adolescent psychiatry patients, finding a prevalence of 11.3%. In our study, which used a different instrument, 20.7% of the inpatients showed addictive usage patterns. The rise of mobile internet use in recent years may have contributed to this.

Nearly 30% of all adolescent inpatients in our study showed signs of dysfunctional internet use. In clinical practice, therefore, digital media use should be taken into consideration on a routine basis in inpatient treatment and assessment. Our data suggest that young people with mental health issues have difficulties acquiring balanced, competent media use skills.

As to our second hypothesis, data from this study show that within the inpatient group, adolescents showing signs of PIU differed significantly from normal users in several psychopathological features. Figure 2 shows these associations schematically.

First, patients with PIU had significantly more suicide attempts than patients with normal internet use. This finding is in line with several other studies showing a close association between suicidality and PIU [8, 9, 41, 42]. Second, patients with PIU reported more difficulties in establishing a stable and consolidated identity and especially problems with ego strength, suggestibility, awareness of a defined core and inner substance, and understanding motives and behavior. To our knowledge, this study is the first to demonstrate an association between juvenile PIU and identity problems using a structured questionnaire (AIDA). A third association was found between PIU and cluster B personality disorders, especially juvenile borderline personality disorder. To our knowledge, there are no other studies showing this association in adolescent inpatient samples. One study found similar associations in a French adult sample of outpatients [62]. The association of identity diffusion with aspects of personality

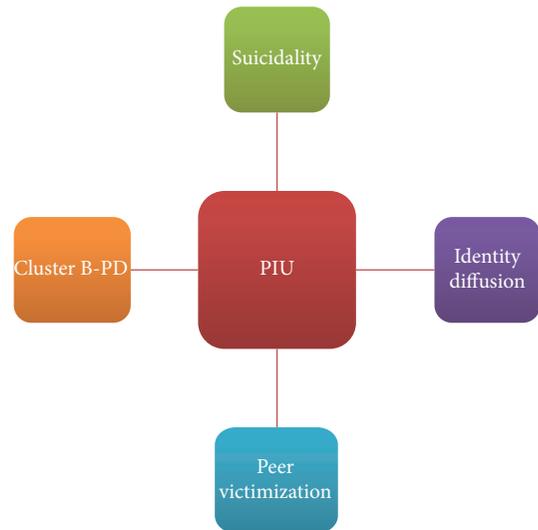


FIGURE 2: Cluster of psychopathology associated with PIU.

disorders in our PIU sample indicates that this psychopathological cluster specifically interferes with the consolidation of competent media use. Potentially, instability in interpersonal relationships and problems with identity and ego strength are expressed or compensated in these adolescents via online outlets. Fourth, patients with PIU reported significantly more instances of being bullied than patients without PIU, both offline and online. This is in line with several studies showing this association in adolescent European [63] and Asian [64] samples. In our study, being bullied online (“cyberbullying”) was the far less frequent scenario than being bullied “face to face”, in both the normal use group and the PIU group. This supports the findings of Wolke et al. [65], who describe cyberbullying as a modern tool that supplements traditional forms. Nevertheless, the presence of cyberbullying seems to be an important risk factor for psychological distress and suicidality, especially in adolescents with intensive use of SNS [44]. As a consequence, the combination of PIU, especially the heavy use of SNS, and the presence of cyber-victimization should be specifically assessed.

To our knowledge, no study to date has directly compared the prevalence of PIU in adolescent CAP-IP with a matched control group of nonreferred peers using the same diagnostic instrument. Furthermore, relatively few studies have examined the relationship of PIU and psychiatric comorbidities in the context of inpatient treatment. Our data thus add important new perspectives to the literature. Nevertheless, some limitations should be taken into account. First, the proposed cut-off values for the CIUS [49, 50] have not been empirically determined for adolescents and have been challenged by recent publications [24]. However, using these cut-off values, prevalence figures in our school sample were very close to previous findings gathered in large populational samples from Germany [24, 27], being indicative of the representativeness of our control sample and of the broader generalizability of our findings. Second, there was a time lag of at least a year between the examination of the school sample and

data collection among CAP-IP. While a rise of PIU between 2009/2010 and 2011/2012 among European adolescents is described in the literature [66], it is unlikely that this phenomenon explains the large differences between school students and patients in our assessment. Third, only a quantitative comparison between the school sample and the clinical sample was possible because additional data on the mental health of the school students could not be assessed. Fourth, the cross-sectional design of our study provides more of a snapshot than a long-term view of PIU. It is thus important to consider data that suggest that PIU is a volatile syndrome with a tendency to recover over time [67]. Moreover, conclusions on cause and effect of PIU and associated psychopathology cannot be drawn.

5. Conclusions

- (i) Problematic and addictive internet use among adolescents undergoing inpatient psychiatric treatment is much more frequent than among their peers in the general population. This suggests that young people with mental health issues have difficulties acquiring balanced, competent media use skills.
- (ii) Our study and previous findings point to an association between PIU and certain problem clusters, that is, suicidality, difficulties in establishing stable and consolidated identity, and peer victimization.
- (iii) As a consequence, digital media use should be taken into consideration on a routine basis in inpatient treatment and assessment in child and adolescent psychiatry. Assessing PIU and peer victimization may help to identify a high-risk group and thus be an important contribution to the prevention of PIU and to the treatment of affected adolescents in inpatient care.

Abbreviations

PMU: Pathological media use
 PIU: Pathological internet use
 CAP-IP: Child and adolescent psychiatry inpatients
 CAP: Child and adolescent psychiatry
 NSSI: Nonsuicidal self-injury.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Evaluation of Risk Factors Affecting Substance Use among Tenth-Grade Students

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Aim. The aim of this study is to detect the prevalence of substance use among tenth-grade students; their thoughts, attitudes, behaviors, and tendencies towards substance use; and risk factors of substance use in tenth-grade students in general. **Methods.** This study is descriptive and cross-sectional conducted between April and May 2016. Research population consists of tenth-grade students in 2015-2016 school year in the city of Ordu. Since the study involved all tenth-grade students, no sampling was done. Questions on substance use were prepared by Ordu Public Health Directorate and the authors by making use of European School Survey Project on Alcohol and Other Drugs (ESPAD) study questions, AMATEM's "Drugs and Addiction Youth Survey" study conducted on May 1996, and scientific studies conducted previously on similar subjects. **Results.** 9825 tenth-grade students in 88 schools from 19 counties in the city of Ordu were included in the study. 8714 of the students participated in the survey. Being male, being over the age of 15, mother and father being separated, living with relatives, being in low income, negative feelings about school, perception of being unsuccessful in school, failing a year, absenteeism, and not being content with life are the risk factors for substance use. **Conclusions.** The tendency of illegal substance use becoming more and more prevalent especially among youth requires the development of new treatment strategies.

1. Introduction

Production, trade, and consumption of illegal substances and related problems increase daily throughout the world; and the average age of users has decreased. Substance use and addiction are an important public health problem rapidly spreading around the world that threatens the users, their families, environments, and the society as a whole, causing health problems and devastating societies in psychological and economical terms with an ever more decrease in the age of users. In this context, substance use and addiction as an overall worldwide issue have become an important problem for our country as well [1, 2]. There are two crucial findings

concerning the studies on substance use: there has been a rapid increase in in USA and in our rates of substance use among the adolescents (high school students) country in recent years; and there has been a decrease in tobacco and alcohol use, while the age of first substance use has become younger [3, 4].

According to a report published by UNODC (United Nations Office on Drugs and Crime), age of first volatile substance use is approximately 11, whereas average age of first cannabis use is 16, and average age of first ecstasy use is 17 years worldwide [5]. It has been found that the age of first substance use in Turkey is 14 [6]. Adolescents constitute the most important risk group in substance use. The most frequent

substance use disorders among adolescents are harmful use and abuse. Addiction is rarely seen until late adolescence [7]. The programs which may assist in the problem of substance use are prevention and early intervention programs. There are two important reasons with regard to these programs: labor spent and cost of substance use prevention programs are less than the labor and cost spent for treatment and reintegration of substance addicts. Prevention of use in early stages provides for the reduction in substance addiction and increase in lifetime [8].

In order for the substance use prevention programs to be successful in adolescence, it is necessary to determine the children and adolescents under risk and to know what kind of personal and environmental factors create risk in terms of substance use in adolescence [4–7].

The aim of this study is to detect the prevalence of substance use among tenth-grade students; their thoughts, attitudes, behaviors, and tendencies towards substance use; and risk factors of substance use in tenth-grade students in general. Furthermore, treatment and rehabilitation of substance addicts by establishing the early periods of substance use, making a contribution to the preventive programs for children and their families under risk, and supplying data to struggle against addiction are among the objectives of the study.

2. Materials and Method

This study is descriptive and cross-sectional conducted between April and May 2016.

2.1. Research Population and Sample Size. Research population consists of tenth-grade students in 2015-2016 school year in the city of Ordu. Since the study involved all tenth-grade students, no sampling was done. In our study Admission Criteria and Criteria for Exclusion are as follows.

2.1.1. Study Admission Criteria

- (i) To be a tenth-grade registered student in 2015-2016 school year in the city of Ordu
- (ii) To have given consent to participate in the study, minors given consent were provided by parents.

2.1.2. Criteria for Exclusion

- (i) Explicit discrepancy and contradiction in survey responses
- (ii) More than 50% of survey answers left unanswered.

2.2. Data Collection

Survey. Questions on substance use were prepared by Ordu Public Health Directorate and the authors by making use of European School Survey Project on Alcohol and Other Drugs (ESPAD) study questions, AMATEM's "Drugs and Addiction Youth Survey" study conducted on May 1996, and scientific studies conducted previously on similar subjects.

There are a total of 35 questions in the survey. Distribution of questions are as follows: Twelve of the questions are about sociodemographic characteristics, two are about the personal moods of the students, four are about school life, two are about cigarette smoking and alcohol use, six are about addiction status of the family and friends, and nine are about illegal substance use.

2.3. Data Collection Method. The data were collected by a survey applied on the students who agreed to participate in the study on a voluntary basis. The survey was conducted on May 4, 2016, simultaneously in the city center and each district.

The research was conducted by a coordinator teacher working in the school with training on substance use (in most of the schools, school counselors performed the duty) and teachers working as survey conductors who were preferably trained in the area and selected by the coordinator teacher. In order to increase the reliability of the research procedure, we made a point of not assigning class masters to carry out the procedure in their own classes.

Necessary training was given to teachers prior to the study in each county separately between April 12, 2016, and April 26, 2016, in places determined by the Ordu Public Health Directorate and by the Provincial Directorate for National Education. In accordance with the distribution lists prepared following the training, questionnaire forms prepared separately for each school were delivered to the school coordinator.

Students answered the survey questions in their classrooms under the supervision of the assigned survey conductors. Prior to the distribution of the survey, survey conductors informed the students of implementation of the survey including the annotations and emphasized especially that personal information would be kept confidential.

The surveys were filled anonymously, and questionnaire forms were collected randomly after completion.

Each survey conductor delivered the charts informing about the class size, number of students absent in class, and the number of questionnaire forms collected, to the school coordinator who in turn made an inventory of the data based on the surveys.

The questionnaire forms were put in plastic files or yellow envelopes separately so that the classes would not get confused and, then, collectively put in a big envelope or package (closed and with the school name visibly on top) and delivered to the county Public Health Centers without any delay (in two days).

Surveys collected in District Community Health Centers were submitted to Ordu Public Health Directorate without any delay with a written report. We have also obtained administrative permits and ethical approval for the use of data for publication purposes.

2.4. Evaluation of the Data and Statistical Analysis. The data collected for the study were evaluated via SPSS 18.0 (Statistical Package for Social Sciences) package program. Descriptive findings were expressed in numbers and percentage distributions.

TABLE 1: Distribution of schools and students participated in the study in the city according to school characteristics.

City of Ordu	High school	Science high school	Anatolian high school	Vocational and technical Anatolian high school	Religious vocational high school	Total
Number of schools	2	4	40	25	17	88
School ratio (%)	2.0	5.0	46.0	28.0	19.0	100.0
Number of tenth-grade students	287	481	2990	3033	1608	8399
Ratio of tenth-grade students (%)	3.4	5.7	35.6	36.1	19.1	100.0

TABLE 2: Distribution of participants according to gender and age.

	Number	%
Gender		
Female	4322	51.5
Male	4066	48.5
Age		
Age: 14	27	0.3
Age: 15	1459	17.4
Age: 16	5909	70.4
Age: 17	1000	11.9
Total	8399	100.0

Regarding the analysis of the explanatory findings and the comparison of percentages in independent groups, significance test (chi square test) of the difference between two independent ratios was used and the significance level was accepted as $\alpha = 0.05$.

Additionally, binary logistic regression (Forward: Conditional) analysis was carried out by using variables that were found to have a significant correlation ($p < 0.05$) with substance use in the chi square test (23 variables).

In logistic regression, dependent variable was measured on a dichotomous scale as user and nonuser of any substance in their lifetime, whereas independent variables were measured in dichotomous or nominal terms.

3. Results

3.1. Descriptive Results. 9825 tenth-grade students in 88 schools from 19 counties in the city of Ordu were included in the study. 8714 of the students participated in the survey. The rate of participation was 88,7%. Surveys of 8714 students out of 8399 were deemed valid. The distribution of schools and students participated in the study in the city according to school characteristics is given in Table 1.

48,5% of participants in the study were males and 51,5% were females. Most of the participants were in 16 years' age group (70,4%) whereas 17,4% were in 15, and 11,9% were in 17 years' age group. 0,3% of the students were in 14 years' age group, and the least number of the participants was in this group (Table 2).

While the ratio of students whose mothers were not alive was 1,2%, ratio of students whose fathers were not alive was 3,3%. The ratio of participants whose mothers and fathers were separated was 8,1%. While 83,0% of the participants

live with their family, 1,5% live with their relatives. The ratio of the participants living in state or private dormitories was 15,2%. While 17,1% of the students perceived the income level of their family as low, 14,5% perceived it as high. Majority of the students (67,8%) stated that the income level of the family was equal to the expenses. While the ratio of the participants living with five or more people was 51,6%, the ratio of participants living with less than five people was 48,4%. The education level of the mother and father was mostly primary school or lower (58,3% and 38,3%, resp.). 80,7% of the mothers were unemployed. Employment ratio of the fathers was 83,3% (Table 3).

Ratio of the participants who have positive feelings about their school was 43,2% whereas the ratio of the students with negative feelings was 55,5%. 0,7% of the students did not give any opinion or an answer to this question. 8,8% of the participants stated that they failed a year and 33,2% stated that they were absent in the past month. Moreover, only 39,4% thought they were successful in school.

Ratio of participants who were content with life was 60,7%. The ratio of participants who gave a negative answer to this question was 23,4%, and 15,9% of the participants did not give their opinion. The ratio of cigarette smoking in the family was 62,1% whereas ratio of alcohol use in the family was 12,1%. The ratio of cigarette smoking among friends was 70,4%; the ratio of alcohol use was 32,9%. Substance use in the family was 2,6% whereas the ratio was 10,2% for friends.

12,2% of the participants stated they smoke. The ratio of participants who stated they tried smoking was 27,1%, whereas 60,7% never smoked.

Similarly, 5,5% stated they use alcohol, and 13,8% stated they have tried alcohol once, whereas 81,1% never tried alcohol.

Ratio of participants who agreed with the statement "My willpower is strong I wouldn't be addicted even if I used" was 22,4%.

Ratio of participants who agreed with the statement "There is no harm in using drugs once" was 6,2%.

Ratio of participants who agreed with the statement "If people want, they can control narcotic substance use" was 38,0% (Table 4).

While 97,5% of the participants answered no to the question of whether there was anyone offering, selling, or giving drugs within the school premises in the city of Ordu; 2,2% answered yes and 0,3% did not answer.

293 out of 8399 tenth-grade students stated that they have used a substance at least once in their lifetime. The ratio of

TABLE 3: Distribution of participants according to sociodemographic characteristics.

	Number	%
Is the mother alive?		
Yes	8301	98.8
No	97	1.2
Is the father alive?		
Yes	8121	96.7
No	277	3.3
Are mother and father separated?		
Separated	683	8.1
Not Separated	7712	91.8
Life style		
Lives with family	6969	83.0
Lives with relatives	122	1.5
Lives in state dormitory	1118	13.3
Lives in private dormitory	161	1.9
Number of people living together		
2 people	263	3.1
3 people	945	11.3
4 people	2624	31.2
5 and more	4330	51.6
Mother's education status		
Illiterate	560	6.7
Literate	373	4.4
Primary school	3964	47.2
Middle school	1840	21.9
High school	1205	14.3
College-university	326	3.9
Father's education status		
Illiterate	112	1.3
Literate	206	2.5
Primary school	2900	34.5
Middle school	2071	24.7
High school	1945	23.2
College-university	803	9.6
Mother's employment status		
Yes	1609	19.2
No	6780	80.7
Father's employment status		
Yes	7036	83.8
No	1350	16.1
Income status		
Income exceeds expenses	1218	14.5
Income equals to expenses	5698	67.8
Income is less than expenses	1437	17.1
Total	8399	100.0

any substance use at least once in lifetime among tenth-grade students was 3,5%. 234 out of 293 participants who stated they have used a substance at least once in their lifetime answered the question regarding the "number of use in the last 30 days." Approximately half of the users (124 people)

TABLE 4: Distribution of belief and thoughts regarding substance use.

	Number	%
Statement 1		
" My willpower is strong so I wouldn't be addicted even if I used"		
I don't agree	5030	59.9
I agree	1885	22.4
I don't know	1451	17.3
No answer	33	0.4
Statement 2		
"There is no harm in using drugs once"		
I don't agree	7428	88.4
I agree	522	6.2
I don't know	419	5.0
No answer	30	0.4
Statement 3		
"If people want, they can control narcotic substance use"		
I don't agree	3990	47.5
I agree	3188	38.0
I don't know	1186	14.1
No answer	35	0.4
Total	8399	100.0

stated that they used substance 1-2 times within the past month. 261 out of 293 participants responded to the question regarding the supplier of the substance. 59,4% of the users (174 people) stated that they acquired it from their friends. Trying (curiosity) occupied the first place (91 people) as a reason for substance use (Table 5).

Evaluation of substance use according to the school characteristics demonstrated that vocational and technical Anatolian high schools had the highest ratio with 4,8% (Table 6).

3.1.1. Correlation between School Characteristics and Substance Use. When substance use according to school characteristics is evaluated, the highest ratio was vocational and technical Anatolian high schools with 4,8%. This relationship between the school characteristics and substance use is also statistically ($p < 0.001$) significant (Table 7).

In Conclusion. Studying in vocational technical and Anatolian high schools is a risk factor in terms of substance use.

3.1.2. Gender, Age, and Substance Use Correlation. The rate of substance use was 4,8% in male students and 2,2% in female students. The rate of substance use was higher in males, and the difference between male and female students is statistically significant ($p < 0.001$). While substance use in students of 15 and older (age 16 and 17) was 3,9%, it was 1,8% for students aged 15 and younger (age 14 and 15). Substance use was two times more in students aged 15 and older (age 16 and 17) compared to students aged 15 and younger (age 14 and 15); and the difference is also statistically significant

TABLE 5: Substance use status.

	Number	%
Any substance use to date		
Yes	293	3.5
No	8106	96.5
Substance use in the past 30 days		
1-2 times	124	53.0
3-5 times	28	12.0
6-9 times	5	2.1
10-19 times	19	8.1
20-39 times	15	6.4
40 or more times	43	18.4
Answered by	234 people	
Those from whom the substance is acquired		
Brother/sister	30	10.2
Friends	174	59.4
A stranger	57	19.5
Answered by	261 people	
Reasons for substance use		
To try (curiosity)	91	31.1
Fun	31	10.6
Boredom	26	8.9
Because friends are using	16	5.5
No special reason	37	12.6
To get away from problems	50	17.1
To calm down when angry	18	6.1
To sleep comfortably	1	0.03
Family influence	6	2.0
Answered by	276 people	

($p < 0.001$). *In conclusion*, being male and over the age of 15 is a risk factor for substance use.

Substance use in students whose parents are separated (5,3%) was significantly ($p < 0.01$) higher compared to substance users whose parents are not separated (3,3%). The rate of substance use in children who perceived their income level as low (5,0%) was significantly higher ($p < 0.01$) than the rate of substance use of the children (or children who stated they tried a substance) who perceived their income level as normal or good. Substance use in children living with relatives (8,2%) was higher than children living with family (3,3%) and living in private or state dormitories (3,6%). On the other hand, there was no significant correlation between substance use and whether their mother or father is alive, number of people they live with, education, and employment status of the parents. *In conclusion*, mother and father being separated, living with relatives, being in low income group are risk factors for substance use.

Substance use in students with negative feelings about their school (4,8%) was much higher compared to others (1,8%) and the difference is statistically significant ($p < 0.001$).

The rate of substance use in students who think they are not successful in school was (6,0%) two times more

than students who think they are successful (3,0%) and the difference is statistically significant ($p < 0.001$).

While the substance use in students who failed a year was 7,4% it was 3,1% in students who did not fail a year. Substance use ratio was two times more in students who failed a year and the difference is statistically significant ($p < 0.001$).

Substance use in students with school absenteeism was 6,6%, whereas it was 1,9% in students with good attendance and the difference is statistically significant ($p < 0.001$). *In conclusion*, negative feelings about school, perception of being unsuccessful in school, failing a year, and absenteeism are risk factors for substance use.

Substance use ratio in students who stated they are not content with their life (7,7%) was much higher compared to others (2,2%) and the difference is statistically significant ($p < 0.001$). *In conclusion*, not being content with life is a risk factor for substance use.

3.1.3. Correlation between Substance Use, Smoking, and Alcohol Use in Family and among Friends. When the correlation between tobacco, alcohol, and substance use in family and friends of the children who have used any substance in their lifetime is examined, substance use in students whose family and friends use any substance, tobacco, and alcohol is significantly higher ($p < 0.001$) (Table 8).

In Conclusion. Tobacco use in family and among friends, alcohol use in family and among friends, substance use in family and among friends are risk factors for substance use.

Substance use in children who smoke was 15,7%, while it was 0,6% in students who do not smoke. Substance use in children who use alcohol was 25,5% while it was 1,3% in students who do not use alcohol. The difference is statistically significant ($p < 0.001$).

In Conclusion. Tobacco and alcohol use are risk factors for substance use.

Substance use in students who did not agree with the statement "My willpower is strong so I wouldn't be addicted even if I used" was 2,3%, whereas it was 5,2% in students who agreed to the statement. Substance use in students who did not agree with the statement "There is no harm in using drugs once" was 2,5%, whereas it was 11,6% in students who agreed with the statement. Substance use in students who did not agree with the statement "If people want, they can control narcotic substance use" was 2,4%, whereas it was 4,4% in students who agreed with the statement. For all three statements, substance use was significantly higher in students who agreed with the statements compared to those who did not. The correlation is especially strong for the second statement. *In conclusion*, having wrong beliefs and thoughts regarding substance use and addiction is a risk factor for substance use.

In the first stage, regarding the analysis of the data collected, the correlation between the variables was analyzed using the "chi square test." According to the analysis, 23 variables were detected to have a statistically significant correlation with substance use. The variables (risk factors) that increased the substance use significantly are as follows:

TABLE 6: Distribution of substance use according to school characteristics.

City of Ordu in general	High school	Science high school	Anatolian high school	Vocational and Anatolian high school	Religious vocational high school	Total
Number of tenth-grade students	287	481	2990	3033	1608	8399
Substance users (number)	10	8	88	145	42	293
Ratio of substance users	3.5%	1.7%	2.9%	4.8%	2.6%	3.5%

TABLE 7: Substance use according to school characteristics.

School characteristics	Any substance to date in life				Total		χ^2/p
	User		Nonuser		Sayı	%	
	Sayı	%	Sayı	%			
High school	10	3.0	277	97.0	287	100.0	$\chi^2: 27.17 p < 0.001$
Science high school	8	1.7	473	98.3	481	100.0	
Anatolian high school	88	2.9	2902	97.1	2990	100.0	
Vocational technical Anatolian HS	145	4.8	2888	95.2	3033	100.0	
Religious vocational high school	42	2.6	1566	97.4	1608	100.0	
Total	293	3.5	8106	96.5	8399	100.0	

- (i) Studying in vocational technical and Anatolian high school
- (ii) Studying in the center of Altınordu
- (iii) Being male
- (iv) Being over the age of 15
- (v) Mother and father being separated
- (vi) Living with relatives
- (vii) Being in the low income group
- (viii) Having negative feelings about school
- (ix) Believing they are not successful in school
- (x) Failing a year
- (xi) Absenteeism
- (xii) Not being content with life in general
- (xiii) Tobacco use in family
- (xiv) Tobacco use among friends
- (xv) Alcohol use in family
- (xvi) Alcohol use among friends
- (xvii) Substance use in family
- (xviii) Substance use among friends
- (xix) Smoking
- (xx) Alcohol use
- (xxi) Having prejudices regarding substance use and addiction and the nature of addiction, agreeing with wrong beliefs and thoughts stated below:

Statement 1. “My willpower is strong so I wouldn't be addicted even if I used.”

Statement 2. “There is no harm in using drugs once.”

Statement 3. “If people want, they can control narcotic substance use.”

In the second stage of the analysis, a stronger and more reliable and advanced statistical analysis technique of logistic regression analysis was conducted for the 23 variables that were found to have a significant correlation with substance use in the chi square test. In the logistic regression analysis, it was found that only 7 out of the 23 variables that have a significant effect on substance use had a significant correlation with substance use in chi square test. The variable county where the *school is located* was classified in four groups as Altınordu center, Fatsa, Ünye, and other peripheral counties. When the odds ratios (OR) of the variables were examined, it was found that compared to Altınordu center odds ratio in other peripheral counties was 0,599, odds ratio in Fatsa was 0,664, and it was 01,021 in Ünye. Odds ratio and the confidence intervals are given in Table 9.

According to the findings, the *risk factors* that affect substance use of tenth-grade students are as follows:

- (1) Not being content with life
- (2) Substance use in the family
- (3) Substance use among friends
- (4) Tobacco use
- (5) Alcohol use
- (6) Agreement with the statement “There is no harm in using drugs once”
- (7) School being in Altınordu center (Table 9).

4. Discussion

Recently, the problem of substance use and abuse has come to the fore in Turkey. When epidemiological and other records

TABLE 8: Distribution of substance use according to substance, tobacco, and alcohol use in family and among friends.

	User			Any substance used to date in life			Nonuser			Total			χ^2 / p
	Number	%	Number	%	Number	%	Number	%	Number	%			
Tobacco use in family													
Yes	220	4.2	4994	95.8	5214	100.0	5214	100.0	5214	100.0	$\chi^2; 22.49$		
No	72	2.3	3108	97.7	3180	100.0	3180	100.0	3180	100.0	$p < 0.001$		
Total	292	3.5	8102	96.5	8394	100.0	8394	100.0	8394	100.0			
Alcohol use in family													
Yes	102	10.0	914	90.0	1016	100.0	1016	100.0	1016	100.0	$\chi^2; 148.15$		
No	190	2.6	7187	97.4	7377	100.0	7377	100.0	7377	100.0	$p < 0.001$		
Total	292	3.5	8101	96.5	8393	100.0	8393	100.0	8393	100.0			
Tobacco use among friends													
Yes	271	4.6	5643	95.4	5914	100.0	5914	100.0	5914	100.0	$\chi^2; 72.24$		
No	21	0.8	2450	99.2	2450	100.0	2450	100.0	2450	100.0	$p < 0.001$		
Total	292	3.5	8093	96.5	8385	100.0	8385	100.0	8385	100.0			
Alcohol use among friends													
Yes	221	8.0	2545	92.0	2766	100.0	2766	100.0	2766	100.0	$\chi^2; 249.08$		
No	71	1.3	5541	98.7	5612	100.0	5612	100.0	5612	100.0	$p < 0.001$		
Total	292	3.5	8086	96.5	8378	100.0	8378	100.0	8378	100.0			
Substance use in family													
Yes	53	23.9	169	76.1	222	100.0	222	100.0	222	100.0	$\chi^2; 284.61$		
No	237	2.9	7925	97.1	8162	100.0	8162	100.0	8162	100.0	$p < 0.001$		
Total	290	3.5	8094	96.5	8384	100.0	8384	100.0	8384	100.0			
Substance use among friends													
Yes	155	18.1	703	81.9	858	100.0	858	100.0	858	100.0	$\chi^2; 603.59$		
No	137	1.8	7378	98.2	7515	100.0	7515	100.0	7515	100.0	$p < 0.001$		
Total	292	3.5	8081	96.5	8373	100.0	8373	100.0	8373	100.0			

TABLE 9: Logistic regression analysis results comprising the variables that affect substance use status of students.

Variables	B	Stan. Err.	Wald	df	p	(OR)	95% confidence interval Lowest	Highest
Content with life status reference: Content	.545	.143	14.501	1	<0.001	1.724	1.303	2.282
Substance use in the Family reference: No substance use in the family	1.117	.233	22.891	1	<0.001	3.055	1.934	4.828
Substance use among friends Ref.: No use among friends	1.129	.158	51.227	1	<0.001	3.092	2.270	4.212
Tobacco use reference: No. Never Smoked			61.675	2	<0.001			
Tried once	1.523	.229	44.179	1	<0.001	4.586	2.927	7.186
Yes. I smoke	1.963	.253	59.949	1	<0.001	7.118	4.331	11.698
Alcohol use reference: No. never used			46.164	2	<0.001			
No. but tried once	.712	.182	15.392	1	<0.001	2.039	1.428	2.911
Yes. I use	1.441	.212	46.062	1	<0.001	4.225	2.787	6.405
"If people want, they can control narcotic substance use" Statement reference: Don't agree	.732	.155	21.514	1	<0.001	2.055	1.516	2.787
County where the school is located reference: Altınordu Center			10.047	3	.018			
Other counties	-.512	.216	5.627		.018	.599	.393	.915
Fatsa	-.410	.218	3.533	1	.060	.664	.433	1.018
Ünye	-.021	.171	.015	1	.902	1.021	.731	1.428
Constant	5.612	.226	618.895	1	<0.001	.004		

are examined, it is reported that the rate of substance use in Turkey is lower than the rate of substance use in European countries and United States of America; however, there has been an increase in the prevalence of substance use [7–10]. There are epidemiologic studies for evaluating the prevalence of substance use in our country, even though they are small in number [7–12].

Among the tenth-grade students in the city of Ordu, the ratio of *any substance use at least once in life* was found to be 3,5%. 12,2% of the participants stated they smoke while 5,5% stated they use alcohol. Adolescence period is characterized by pubertal maturation, continuation of brain development, changes in social roles, and increase in risky behavior and substance use is frequent. In Turkey, the ratio of trying an illegal substance at least once in life among 10th-grade students was 10% [13]. Substance use in adolescence is important because it disrupts cognitive, physical, and psychological development and increases the risk of addiction and medical problems [14, 15].

Often a psychiatric disease accompanies substance use in adolescents. In a public sample study, it was shown that at least one psychiatric disorder accompanied substance addiction in 90% of adolescents under the age of 15; and the most frequent accompanying psychiatric disorders were conduct disorder (72.4%), attention deficit disorder with hyperactivity (63.6%), and depression (52.7%) [4].

A national research conducted in the USA with approximately 70.000 participants at the age of 12 and older [7] demonstrated that the rate of illegal substance use within the last month was 10.1% in the year 2010, 10.1% in the year 2011, 9.5% in the year 2012, and 8.8% in the year 2013. The most commonly used substances among the American youth were alcohol, tobacco, and cannabis [16].

Participants who stated they have used a substance at least once in their life have stated that

- (i) they tried/used the substance out of curiosity and to get rid of their problems,
- (ii) they acquired the substance most frequently from friends.

In the logistic regression analysis, it was found that *only seven variables* had a significant effect on the substance use.

Accordingly, risk factors that are effective in substance use in tenth-grade students in the city of Ordu were as follows:

- (1) Not being content with life
- (2) Substance use in family
- (3) Substance use among friends
- (4) Tobacco use
- (5) Alcohol use
- (6) Agreement with the statement “There is no harm in using drugs once”
- (7) School being in Altınordu center.

The odds ratio of the variable “being content with life” was found to be 1,724 (the variable was classified as Yes/No Opinion/No). According to this, the probability/risk of substance

use was 1,724 times more in students who are not content with life compared to students who are content with life.

The odds ratio of the variable substance use in the family was found to be 3,055 (the variable was classified as “Yes, there is” and “No, there is not”). According to this, probability/risk of substance use was 3,055 times more in children with substance use in the family compared to ones without. The odds ratio of the variable substance use among friends was found to be 3,092 (the variable was classified as “Yes, there is” and “No, there is not”).

According to this, probability/risk of substance use was 3,092 times more in children with substance use among friends compared to children without substance use among friends.

The odds ratio of the variable tobacco use was found to be 4,586 in students who tried once and 7,118 in students who are smokers (the variable was classified as No, never smoked; No, but tried once; Yes, I smoke). Probability/risk of substance use in children who agreed with the statement “If people want, they can control substance use” was 2,055 times more compared to those who do not agree with the statement (the variable was classified as “I do not agree,” “I agree”)

Parents’ alcohol or substance use, parents neglecting the child, domestic violence, broken family, inability of parents with multiple children to tend to their children’s problems enough, conflict in child care approaches, extreme discipline or extreme lack of discipline, and not being interested enough in the education and future of the child increase the risk of substance use [17]. In groups with substance use, parental control was found to be lower compared to groups without substance use [18]. Starting substance use at an early age, childhood trauma, and being neglected [19] increase the risk of substance addiction [20].

Even though substance use among primary and secondary education students in Turkey was found to be lower compared to other countries, it was observed that tobacco use is prevalent. During adolescence, alcohol and tobacco use, insufficient and unbalanced nutrition, use of addictive substances, unsafe sexual activity, and violence are risky health behaviors [21] and they tend to increase during this period [22]. The effort of adolescents to be accepted among friends, the desire to be treated as an adult, and effort to create a new identity result in risk taking and risky health behaviors [21, 23–27].

In a study done with adolescents, it was determined that there was a significant difference between domestic conflict and problematic behavior, and the finding was interpreted as increasing negative behaviors such as alcohol, tobacco, and narcotic substance use [22]. It was demonstrated that adolescents who make use of their time well, who have a close relationship with their parents, who are successful and committed in school show less risky behaviors whereas being in a state of constant anxiety and despair are significant variables in risky behaviors [22–24]. Events that are experienced and acquired habits and behaviors during adolescence have long term results that affect the life of individual [21].

Substance use which is an important public health issue has negative psychological and biological effects on adolescents and the rate of substance use has increased in

our country. Negative peer pressure, media messages, and family problems can cause tobacco, alcohol, and drug use in adolescents. Tobacco, alcohol, and narcotic substance use is an important public health problem [25, 26].

Substance use is an important public problem both in developed and in developing countries, and it causes serious health problems. Cannabis, cocaine, nonmedical use of medicine for sleep disorders (or hypnotics) and benzodiazepines, and stimulants such as amphetamines are among the most frequently used psychoactive substances besides tobacco and alcohol [27]. The rate and form of substance use change depending on gender, society, and country; and, according to 2012 estimates, it was stated that 243 million people (approximately 5.2% of the population) between the ages of 15 and 64 used cannabis, cocaine, opioid substances, or amphetamine [28].

Symptoms of drug use are loss of appetite, sudden changes in mood, problems at school or work, risky behaviors, and problems with coordination, attention, and memory and families should be informed and cautious about these factors [29]. Adolescents begin substance use with substances that are easier to find. Substance use begins with tobacco and alcohol may be followed by narcotic substances in the following stages. Cannabis is the most frequently used among illegal drugs and usually evolves from tobacco and alcohol use, which are followed by cannabis use, which is followed by narcotic use [30, 31].

Limitations of the study can be described as follows. Conducting studies evaluating the frequency of substance use disorders and influencing factors is difficult, since people who use substances tend to hide it; and it is difficult to approach groups using substances. Moreover, since our study was done using surveys, contrary to determining the substance users, it is not easy to detect people who are addicted to substances.

In conclusion, not being content with life, substance use in the family, substance use among friends, tobacco use, alcohol use, and agreement with the statement "There is no harm in using drugs once" are the main risk factors. The tendency of illegal substance use becoming more and more prevalent especially among youth requires the development of new treatment strategies [32, 33]. Priority of protective measures should not be glossed over in planning alternative treatments.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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Research Article

Adolescent Internet Abuse: A Study on the Role of Attachment to Parents and Peers in a Large Community Sample

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Adolescents are the main users of new technologies and their main purpose of use is social interaction. Although new technologies are useful to teenagers, in addressing their developmental tasks, recent studies have shown that they may be an obstacle in their growth. Research shows that teenagers with Internet addiction experience lower quality in their relationships with parents and more individual difficulties. However, limited research is available on the role played by adolescents' attachment to parents and peers, considering their psychological profiles. We evaluated in a large community sample of adolescents ($N = 1105$) the Internet use/abuse, the adolescents' attachment to parents and peers, and their psychological profiles. Hierarchical regression analyses were conducted to verify the influence of parental and peer attachment on Internet use/abuse, considering the moderating effect of adolescents' psychopathological risk. Results showed that adolescents' attachment to parents had a significant effect on Internet use. Adolescents' psychopathological risk had a moderating effect on the relationship between attachment to mothers and Internet use. Our study shows that further research is needed, taking into account both individual and family variables.

1. Introduction

During the last decade, there has been an enormous development and diffusion of new forms of Internet-information and communication technology, such as social media, personal computer, mobile or cellular phone, and other devices [1]. Adolescents and young adults represent the most users of these different tools [2, 3], and the main purpose of use is social interaction and interpersonal communication [4]. However, research has underlined that some adolescents tend to use Internet excessively or in a maladaptive way, especially to manage psychological suffering [5] and negative emotions associated with problematic relationships with parents and peers [6].

During adolescence numerous changes occur, abilities functional to self-regulation are still relatively immature [7]: recent studies on adolescents' brain development highlighted that emotion-activating experiences (including the over- or misuse of Internet) could interfere with significant modifications of brain regions and systems, such as the prefrontal cortex and the limbic system. These areas play a key role in the regulation of emotions and in the evaluation of the risk [8, 9]

and could be responsible for adolescents' general tendency to risk taking and impulsivity [10, 11]. Therefore, it may explain also adolescents' vulnerability to excessive use of Internet, especially with the lack of self-regulatory strategies [12] and when parents are unable to offer an external regulation to their offspring. Moreover, from a developmental point of view, young people go through many developmental tasks and, despite the time spent on the Internet, this could have a different function for them [13]. Specifically, in the early adolescence (from 12 to 14 years; [14]), numerous physical and emotional changes triggered by puberty occur and there is a progressive increase of reflection on emotional experiences [15]; middle adolescence (from 15 to 17 years) is characterized by the onset of adolescent's psychological separation from parents and of the concomitant research of new significant extrafamilial figures, first of all peers; finally, during the late adolescence (from 18 to 20 years), youth have to define their personal, social, and sexual identities [14, 16, 17]. Thus, Internet gives youth also the opportunity to experiment and explore important adolescent-phase questions, including identity, autonomy, and sexuality [13, 18].

Beyond the numerous advantages offered by the new forms of technology, recent research has evidenced that adolescent population had a higher risk to develop Internet problematic behavior, a condition defined as Internet addiction (IA) [19]. However, scientific literature in this field is contrasting [20, 21]: the term IA [19] has also been questioned and other authors have used definitions such as compulsive use of the Internet, problematic use of the web, and pathological use of the Internet [22, 23]. IA has been conceptualized as an impulse-control disorder [24], often described as a behavioral addiction [25], which is characterized by an excessive or uncontrolled Internet use that leads to functional impairment and feelings of marked distress [26]. Despite the growing interest shown in considering IA as a specific diagnosis of behavior addiction, to date Section III of DSM-5 [27] included only an Internet-related condition (i.e., Internet gaming disorder [IGD]). However, given that research evidences on IA are yet inconsistent, editors recommended future researches in this field [27].

Among adolescent and young adult population, epidemiological research reported a prevalence ranging from 1% to 18% [25, 28, 29], with higher rates among males [30]. Interestingly, a broad percentage of adolescents (approximately from 12% to 20%) reported an excessive use of Internet, unsatisfying all criteria for IA [31, 32].

However, although the literature has been increasingly interested in the possible impact of Internet use/abuse on adolescent's development, limited research is available on the role played by adolescents' quality of attachment to parents and peers, considering their psychological profiles.

In accordance with the Developmental Psychopathology [33], clinical and subclinical psychological difficulties in adolescence are postulated to be the result of dynamic interaction of different type of protective and/or risk factors, with a central role played by both individual vulnerability and the quality of relationships with parents and friends. Moreover, difficulties in relationships with parents and friends may have bidirectional relationships with psychological difficulties.

During adolescence, there is an increased need for autonomy and independence from parents. Consequently, in these different phases adolescents have to renegotiate their relationships with them [34, 35] and the acceptance from peers became more influential than in earlier ages. However, the quality of relationship with parents remains a fundamental aspect for adolescents' development and adjustment [36–38] and for a good result of transition to autonomy and adulthood [39].

Attachment theory [40] offers a valid model to understand the protective or risky role played by relationship with parents in the development of adolescents' addictive online behavior. In accordance with Armsden and Greenberg [41] adolescents' perceptions of attachment to their parents reflect their perceived emotional closeness and support from attachment figures, in terms of involvement, trust in the accessibility and responsiveness of them, warmth, and nurturance [41]. In particular, in this perspective a problematic Internet use may be considered as a maladaptive strategy used by adolescent to cope with negative emotions associated with situations in which attachment system is activated and to reduce

the distress this produces in them [42]. Thus, they may spend excessive time on Internet to avoid the emotional distress that results from attachment situations or engage in online rewarding activities to replace adverse relationship experiences [43, 44].

In particular, it has been evidenced that low attachment to parents is associated with higher time spent on Internet [4, 45] and risky online activities [46]. Furthermore, higher Internet use is associated with less family time [47], poorer quality of family relationship [48], lower maternal relationships [49], and higher paternal alienation [50], while IA was associated with other adverse conditions like parent-adolescent conflict [51], marital conflict [46], and low satisfaction with family functioning [52, 53].

Adolescents that feel that their relationships with parents are cold, not supportive, and emotionally unavailable may excessively use Internet to search for alternative social support, especially by peers [2, 54]. Indeed, given that relationships with peer become higher priority during adolescence, also the quality of attachment to friends may exert a great influence on adolescent's Internet use [50, 55]. However, to date research has shown mixed findings in the association between IA and the quality of relationships with friends. Research has reported that a low quality of peer attachment was associated with high Internet use [56] and IA [46, 57], but other studies have also found that a good quality of relationship with friends was associated with high Internet use [58] and IA [43], especially for entertainment and social-interaction issues [59]. Overall these findings suggest that problematic relationships with peers, characterized by feelings of isolation, anger, and detachment, could lead to adolescents spending excessive time in Internet to seek refuge in a virtual world in which they could establish "fake" social interactions and friendship [57]. At the same time, also attachment security to peers, in which adolescents experience trust and a good quality of involvement and verbal communication with them, could represent a risk factor for IA, for example, by being involved in activities in which their peer group is engaged [43, 46].

As regards the role played by psychological functioning, several studies, rooted in genetic and epigenetic research, have underlined that adolescents that excessively use Internet often had a wide range of psychosocial correlations, such as impulsivity [60], shyness [61], and aggressive behavior [62]. Moreover, it has been show that IA is associated with psychiatric comorbidities among adolescence and youth population, including depression [63], anxiety disorder [64], and obsessive-compulsive personality disorder [65], but some studies also suggest that adolescents that use Internet in maladaptive way may be affected by subclinical forms of psychological problems [23]. Specifically, research has reported significant associations between both subthreshold and threshold forms of IA and emotional/psychosocial problems [31, 66], including depressive/anxiety symptoms [67], psychosomatic symptoms [68], obsessive compulsion, and interpersonal sensitivity [69]. Overall, these findings suggest that one of the primarily reasons that can lead to adolescent excessively using Internet may be to alleviate psychological suffering and difficulties [5].

On the basis of previous literature, which has underlined the correlations between the adolescents' primary relationships, their psychological difficulties, and the IA, we aim to study in a large community sample the Internet use/abuse. Indeed, to the best of our knowledge, no other studies have specifically investigated adolescents' attachment to parents and peers and its influence on adolescents' Internet use/abuse, considering their psychological profiles. Therefore, the present study aimed to investigate in a large community sample

- (i) differences in the use/abuse of Internet, psychopathological risk, and adolescent's attachment on the basis of sex and age;
- (ii) the influence of attachment to parents and peers on use/abuse of Internet, considering the effect of adolescents' psychological profiles.

2. Materials and Methods

Over a period of one year, 1105 adolescents (43.6% boys and 56.4% girls) from 12 to 20 years (average age = 15.55; SD = 1.68) were recruited for this study, through the collaboration of high schools of center-south of Italy. Sample was divided into three age groups on the basis of scientific literature [14]: *early adolescence*, from 12 to 14 years ($N = 326$; 152 boys and 174 girls); *middle adolescence*, from 15 to 17 years ($N = 434$; 164 boys and 270 girls); and *late adolescence*, from 17 to 20 years ($N = 345$; 166 boys and 179 girls).

This study was approved before its start by the Ethical Committee of the Department of Dynamic and Clinical Psychology at Sapienza University of Rome, in accordance with the Declaration of Helsinki. All adolescents and their parents signed informant consent, in which the study was illustrated in detail.

Most of the adolescents recruited for the study lived in families (98.6%). 83.8% of parents are married or cohabiting ($N = 926$), while 14.8% ($N = 163$) are separated/divorced.

The adolescents who filled out the anamnestic questionnaire (purpose built for the study to evaluate the demographic data of the adolescent and his family) and accepted to participate in the study were administered the following self-reporting instruments. The order of administration was randomly decided.

2.1. Tools. The *Symptom Checklist-90-Revised* (SCL-90-R; [70]) is a multidimensional self-report questionnaire, composed of 90 items. It identifies the presence of psychological symptoms with a broad spectrum that may have been experienced by the subject in the last week. Each item describes a physical or psychological symptom that is evaluated on a Likert 5-point scale (0: not at all, 1: a little, 2: moderately, 3: very, 4: very much). The scores could be interpreted on nine symptomatological dimensions: somatization (SOM; indicating disorders that arise from the perception of bodily dysfunction including cardiovascular, gastrointestinal, and respiratory symptoms); obsessive-compulsivity (O-C; thoughts, impulses, and actions subjectively experienced as persistent and ego-dystonic); interpersonal sensitivity (INT; feelings of inadequacy and inferiority with respect to other people); depression

(DEP; includes a broad spectrum of symptoms associated with a depressive syndrome); anxiety (ANX; general signs of anxiety such as nervousness, tension, and tremors as well as panic attacks and feelings of terror, apprehension, and fear); hostility (HOS; thoughts, feelings, and actions typical of a state of anger, irritability, and resentment); phobic anxiety (PHOB; persistent fearful response—for a specific person, specific place, object, or situation—which is recognized as irrational and disproportionate to the stimulus); paranoid ideation (PAR; corresponding to a thought disorder characterized by suspicion, fear of loss of autonomy, and hostility); psychoticism (PSY; including items indicative of an introverted, isolated lifestyle, as well as symptoms of schizophrenia, such as hallucinations and disorders of thought control). Furthermore, it is possible to score the *Global Severity Index* (GSI), indicating the total subjective distress.

Prunas et al. [71] demonstrated satisfactory internal consistency of the Italian version of the SCL-90-R in adolescents and adults (α coefficient, 0.70–0.96) with a clinical cut-off score ≥ 1 in GSI indicating psychopathological risk [71].

The *Shorter PROMIS Questionnaire* (SPQ; [72] Italian adaptation edited by Baiocco et al., [73]) is considered an accurate indicator of the trend towards dependent behavior. The Shorter PROMIS Questionnaire (SPQ) is a 16-scale self-report instrument assessing the use of nicotine, recreational drugs, prescription drugs, gambling, sex, caffeine, food bingeing, food starving, exercise, shopping, work, dominant and submissive relationships, and dominant and submissive compulsive helping. It consists of 160 items (10 for each scale) and a 6-point Likert scale (from 0, strongly disagreeing, to 5, strongly in agreement). The Italian version of the SPQ [73] has been adapted specifically for adolescents and evaluates also Internet, mobile, and video-games addictions. In addition, the SPQ demonstrated adequate estimates of Internal reliability. Baiocco and colleagues' results [73] suggest a good validity and reliability of the test. In the research presented we have used the specific section on Internet abuse. This subscale consists of 10 items that can be evaluated through a 6-point Likert scale (from 1, extremely false for me, to 6, extremely true for me).

The *Inventory of Parent and Peer Attachment* (IPPA; [74]) is a self-report scale that measures adolescents' perceptions of their attachment to their parents and peers. It considers feelings of security and positive/negative aspects of the affective and cognitive dimensions, presented in the relationship with parents and friends. It is composed of three parts: the first is specific for the mother, the second for the father, the third for friends. The parent parts consist of 28 items for each parent, while the section relative to friends is composed of 25 items. All three are measured on a Likert 5-point scale (from 1, never true, to 5, always true). The items measure both a global score of security attachment and three dimensions of the attachment relationship:

- (i) alienation, which refers to the degree of anger and isolation in attachment relationships;
- (ii) communication, which refers to the quality of communication between the adolescent and attachment figures;

- (iii) trust, which refers to the degree of mutual trust between the adolescent and attachment figures in relation to the experience of feeling accepted.

Studies conducted by the authors show that adolescents who report safety concerns about parents and peers have even less conflict with parents, more satisfaction in life, more self-esteem [74], and poor stress and symptomatology (depression, anxiety, resentment, alienation, hidden anger, and loneliness) [75].

The Italian validation [76] showed a good internal consistency, ranging from .85 to .90 for trust, from .83 to .89 for communication, and from .62 to .71 for alienation.

3. Statistical Analysis

A preliminary screening of the data showed few data missing for each instrument (2% for each instrument). Missing data were corrected using multiple imputation in SPSS software (version 24.0).

To examine the adolescents' use/abuse of Internet, their attachment with parents and peers, and their psychological profiles, we carried out multivariate analyses of variances (MANOVAs), considering the effects of sex and age group. We considered as dependent variables the adolescents' SPQ total score, the IPPA subscales and total scores, the SCL-90-R subscales and total score, while we considered sex and age group as the independent variables. In all MANOVAs, univariate analyses were then conducted on significant effects, and the Bonferroni's test was used for contrasts.

After verifying the presence of correlations between variables, hierarchical regression analyses were conducted to verify the influence of parental and peer attachment on Internet use/abuse, considering the moderating effect of adolescents' psychopathological risk. Specifically, the IPPA instrument's subscales were used as independent variables, adolescents' SCL-90-R Global Severity Index as moderator variable, and the SPQ total score as a dependent variable. Moderation analysis was conducted utilizing the PROCESS macro for SPSS [77]. All analyses were performed with Statistical Package for the Social Sciences, SPSS software 24.0.

4. Results

4.1. Assessment of Use/Abuse of Internet, considering Adolescents' Sex and Age Group. We carried out univariate analysis of variance (ANOVA) to verify differences in Internet use/abuse in adolescence, on the basis of sex and age group. Results show that girls had higher scores than boys ($F = 6.64$; $p < .05$). Furthermore, early adolescents showed higher scores than late adolescents ($F = 5.31$; $p < .01$). No significant differences in scores were found on the basis of sex * age groups ($F = 4.43$; $p > .05$). Table 1 shows mean and standard deviation of adolescents' use/abuse on Internet, on the basis of sex and age group.

4.2. Assessment of Adolescents' Attachment to Parents and Peers, considering Adolescents' Sex and Age Group. We carried out multivariate analysis of variance (MANOVA) to verify

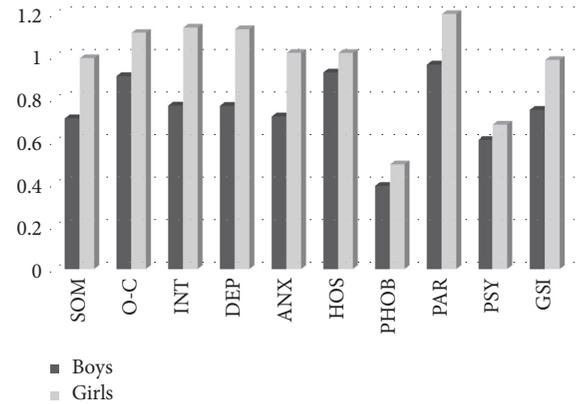


FIGURE 1: Differences of mean scores of SCL-90-R subscales between boys and girls.

differences in adolescents' attachment to parents and peers on the basis of sex and age groups.

Results show the presence of significant differences on the basis of sex ($\Lambda = .85$; $F = 21.24$; $p < .001$). Univariate analyses were conducted on significant effects, and the Bonferroni's test was used for contrasts. Mean and standard deviations of adolescents' attachment to mother, father, and peers on the basis of sex and age group are illustrated in Table 2.

Results of univariate analyses show that girls had higher scores than boys on the scales father alienation ($F = 15.71$; $p < .001$), mother alienation ($F = 11.37$; $p < .01$), mother communication ($F = 13$; $p < .001$), peers communication ($F = 83.29$; $p < .001$), and peers trust ($F = 25.18$; $p < .001$).

4.3. Assessment of Adolescents' Psychological Profiles, considering Adolescents' Sex and Age Group. We carried out multivariate analysis of variance (MANOVA) to verify differences in adolescents' psychological profiles on the basis of sex and age groups.

Results show the presence of significant differences on the basis of sex ($\Lambda = .85$; $F = 17.28$; $p < .001$) and age group ($\Lambda = .95$; $F = 2.6$; $p < .001$).

Univariate analyses were conducted on significant effects, and the Bonferroni's test was used for contrasts. Results of univariate analyses show that girls had higher scores than boys on all SCL-90-R subscales (see Figure 1).

Regarding the effect of age groups, results show differences in SCL-90-R subscales: obsession-compulsivity ($F = 6.31$; $p < .01$), depression ($F = 5.95$; $p < .01$), hostility ($F = 5.23$; $p < .01$), paranoid ideation ($F = 7.07$; $p < .01$), and Global Severity Index ($F = 3.71$; $p < .05$). Bonferroni post hoc test showed that late adolescents had higher scores than early adolescents on SCL-90-R subscales: obsession-compulsivity ($p < .01$), depression ($p < .01$), paranoid ideation ($p < .01$), and Global Severity Index ($p < .05$). Furthermore, late adolescents showed higher scores than other groups on the subscale hostility ($p < .05$). Table 3 shows mean and standard deviations of adolescents' psychological profiles, on the basis of sex and age group.

TABLE 1: Mean and standard deviations of adolescents' scores of Internet use/abuse, on the basis of sex and age group.

	Early adolescence		Middle adolescence		Late adolescence	
	Boys	Girls	Boys	Girls	Boys	Girls
Internet use/abuse	24.64 (9.24)	27.4 (9.5)	23.04 (8.32)	25.49 (9.11)	24.39 (9.46)	23.45 (8.17)

TABLE 2: Mean and standard deviations of adolescents' attachment to mother, father, and peers, on the basis of sex and age group.

	First adolescence		Middle adolescence		Late adolescence	
	Boys	Girls	Boys	Girls	Boys	Girls
Father alienation	18.66 (6.49)	20.31 (6.83)	18.73 (6.91)	19.83 (6.81)	18.37 (6.09)	20.47 (6.54)
Father communication	32.36 (8.17)	30.5 (8.75)	31.49 (8.5)	31.6 (9.52)	32.72 (7.38)	31.55 (8.67)
Father trust	37.75 (8.28)	37.77 (8.58)	38.29 (8.19)	38.18 (8.44)	38.61 (7.39)	37.98 (8.25)
Mother alienation	17.78 (5.9)	20.01 (6.82)	18.24 (5.85)	19.01 (6.33)	18.6 (6.27)	19.46 (6.14)
Mother communication	33.99 (7.77)	34.83 (8.22)	33.49 (7.04)	35.98 (8.39)	33.58 (7.54)	35.63 (8.79)
Mother trust	40.33 (7.04)	39.14 (7.64)	39.78 (6.68)	40.1 (7.41)	39.49 (7.1)	39.77 (7.27)
Peers alienation	17.45 (4.88)	16.29 (4.31)	16.4 (4.96)	15.81 (4.41)	16.03 (4.59)	17.04 (4.26)
Peers communication	26.94 (6.71)	30.69 (6.13)	28.01 (6.86)	32.39 (4.99)	28.98 (6.05)	31.07 (6.13)
Peers trust	39.03 (7.63)	41.28 (7.3)	39.48 (8.01)	42.91 (5.86)	40.02 (7.53)	41.04 (7.48)

4.4. *Assessment of the Influence of Attachment to Parents and Peers on Internet Use/Abuse.* In order to evaluate the influence of attachment on Internet use/abuse, considering the effect of psychological profiles, hierarchical regression analyses were conducted. Specifically, at Step 1 the SCL-90-R GSI and the IPPA subscale scores for fathers, mothers, and peers have been included as independent variables and the SPQ total score as a dependent variable. At Step 2, the interaction between adolescents' GSI and IPPA subscales was inserted in the model as independent variable, to verify moderator effect. Standardized scores were used.

At Step 1, analysis shows that Internet use/abuse was predicted by adolescents' attachment to mothers (Beta = -0.182 ; $t = -6.220$; $p < .001$) and fathers (Beta = -0.163 ; $t = -5.560$; $p < .001$) but not by adolescents' attachment to peers ($p > .05$).

At Step 2, results show that adolescents' Global Severity Index moderated the influence of attachment to mother on Internet use/abuse ($R^2 = .157$; $F = 69.66$; $p < .001$), but this moderating effect was not found in the influence of attachment to father and peer on Internet use/abuse ($p > .05$).

Consequently, we use the PROCESS macro for SPSS [77] to verify moderating effects. Main and interaction effects were centered to minimize multicollinearity [78].

Results show an attachment to mother \times SCL-90-R Global Severity Index interaction effect in predicting use/abuse of Internet ($F(3, 1101) = 69.66$, $R^2\Delta = .16$, $p < .001$). Conditioned at 1 standard deviation below the mean on Global Severity Index, attachment was inversely related to use/abuse of Internet ($t = -6.16$, $p < .001$), and when conditioned at 1 standard deviation above the mean on GSI, attachment was inversely related to use/abuse of Internet ($t = -3.26$, $p < .05$). In fact, test of highest order unconditional interaction showed $R^2\text{chnng} = .0042$; $F = 5.53$; $p = .019$.

Thus, a high attachment to the mother predicted less Internet use/abuse when adolescents presented a low psychopathological risk. However, the effect of attachment to the

mother on less Internet use is still present even in the case of adolescents' higher psychopathological risk, even if this effect is reduced.

5. Discussion

The present paper aimed to assess Internet use/abuse in adolescents from a community sample. In particular, our study aimed to investigate differences between boys and girls in different development stages in Internet use/abuse, their attachment to parents and peers, and their psychological profiles. Furthermore, we wanted to verify whether attachment to parents and peers influenced adolescents' Internet use/abuse, considering adolescents' psychopathological risk.

Regarding the first objective, we carried out multivariate analysis of variance (MANOVA) to verify differences between boys and girls in different development stages in Internet use/abuse. Results showed that girls had higher levels of Internet use/abuse than boys. International scientific literature in this field is contrasting. Although previous researches have evidenced a higher risk of Internet overuse among boys [79, 80], other studies have reported no gender differences in problematic Internet use [81]. These conflicting results may depend on the different research objects (e.g., use of video games, social networks). In our study, we have evaluated Internet use, in its various functions and, as suggested by Karacic and Oreskovic [82], the percentage of female adolescents being Internet addicted is increasing.

Furthermore, analysis showed that early adolescents show higher scores than late adolescents on Internet use/abuse. Previous research has reported mixed findings: some studies have underlined a significant higher incidence of Internet use/abuse during middle adolescence [83] or late adolescence [52], but other studies did not report age differences [84, 85]. In our sample, early adolescents reported higher levels of use/abuse of Internet. This result may depend on changes occurring during early adolescence and the immaturity of

TABLE 3: Mean and standard deviations of adolescents' scores at SCL-90-R subscales, on the basis of sex and age group.

	First adolescence		Middle adolescence		Late adolescence	
	Boys	Girls	Boys	Girls	Boys	Girls
SOM	.66 (.62)	.96 (.73)	.71 (.66)	.97 (.72)	.75 (.62)	1.04 (.73)
O-C	.75 (.63)	1.08 (.76)	.91 (.75)	1.07 (.72)	1.04 (.72)	1.19 (.71)
INT	.65 (.64)	1.18 (.85)	.76 (.71)	1.11 (.76)	.89 (.76)	1.13 (.74)
DEP	.63 (.6)	1.07 (.75)	.79 (.73)	1.11 (.72)	.87 (.67)	1.21 (.71)
ANX	.63 (.6)	.98 (.72)	.73 (.68)	.99 (.67)	.78 (.66)	1.1 (.75)
HOS	.76 (.75)	1.01 (.86)	.93 (.88)	.95 (.78)	1.06 (.89)	1.12 (.89)
PHOB	.4 (.59)	.56 (.67)	.39 (.59)	.48 (.52)	.38 (.54)	.45 (.55)
PAR	.76 (.74)	1.18 (.79)	.96 (.9)	1.16 (.8)	1.15 (.89)	1.27 (.82)
PSY	.53 (.62)	.72 (.65)	.6 (.63)	.64 (.61)	.68 (.62)	.7 (.62)
GSI	.65 (.55)	.98 (.63)	.75 (.62)	.95 (.56)	.84 (.57)	1.03 (.58)

self-regulation abilities, factors that may increase vulnerability to addictions [86, 87].

Moreover, analysis showed that girls had higher levels of communication with mothers than boys, but also higher levels of alienation with fathers and mothers. This is consistent with previous studies that have reported a perception of higher quality of communication with mothers [88] and higher levels of alienation to parents [89] among female adolescents, suggesting that girls are more susceptible to parental response, especially maternal.

Regarding peers, girls showed more trust and communication. This is in line with previous studies that have reported a higher level of peer attachment among teenage girls [90, 91]. Some authors have explained these gender differences on the basis of evidence that girls are more relationship oriented, and they search for closer peer relationships to share emotional issues. In contrast, boys are more object oriented and form relationship primarily to share activities [92].

Interesting data have emerged as regards psychopathological profiles. In fact, analysis showed that girls had more maladaptive psychological profiles than boys on all areas. Recent studies have evidenced that girls reported higher psychopathological symptoms than boys, especially in internalizing area [93], but our results expand these findings also for externalizing problems. This is in accordance with Ara's study [94] who reported a cooccurrence of internalizing and externalizing problems especially among female adolescents.

As regards developmental stage, results showed that late adolescents had higher levels of depression, obsession-compulsivity, paranoid ideation, and hostility than early adolescents and confirm previous studies that have underlined an increase in psychopathological difficulties during the development [95].

International studies have widely evidenced that during adolescence emotional-behavioral functioning is hyperactivated [96] and many young people may excessively use Internet to cope with negative emotions resulting from attachment situations and to lighten psychological suffering [42, 97]. Indeed, many studies have shown that a low quality of parental attachment is related to adolescent behavior addiction, including IA [42, 44]. Also, several empirical studies have evidenced that quality of attachment to parents and

peers was associated with adolescent's psychological adjustment [98, 99] and that these factors influence each other.

On the basis of these theoretical and empirical premises and in order to be able to assess the possible influence of attachment to parents and peers on the use and abuse of Internet, hierarchical regression analyses were conducted, assessing the moderating effect of the psychopathological risk.

Analysis showed that adolescents' attachment to parents (but not to peers) influenced Internet use/abuse. Furthermore, moderation analysis suggested that adolescents' psychopathological risk had a moderating effect on the relationship between attachment to mothers and the use of Internet. Although this result is significant, the effect size is not great (R^2 chng = .0042). In fact, results showed that a higher attachment of adolescents to the mother predicted less Internet use/abuse, but this predictive effect is reduced by the presence of adolescents' psychopathological risk.

Overall, our results evidenced the crucial role played by attachment on adolescent's Internet use. These findings suggest that unpleasant feelings of isolation, anger, or detachment experienced in attachment relationships with parents may predispose adolescents to cope with these emotions through an excessive use of Internet, in order to avoid and/or reduce the distress resulting from adverse attachment experiences [43, 45].

This study has some limitations. In fact, some individual variables of the adolescent were not investigated, such as traumatic events that may have been experienced by young people [100, 101] and the levels of impulsivity [60]. Furthermore, we assessed adolescents' attachment to parents, but we did not evaluate mothers' and fathers' psychopathological risk [102–105]. Notwithstanding the above limitations, the present study has several strengths. In particular, the sample size allows having numerous data on this specific age group. Furthermore, attachment has been investigated both in primary relationships with parents and in relations with peers, allowing a broad view of the relational qualities of adolescents.

In light of the results, we believe that further studies are important to investigate more individual variables of teenagers,

in order to allow greater understanding, so that appropriate prevention and treatment programs may be implemented.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this article.

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Research Article

A Longitudinal Study for the Empirical Validation of an Etiopathogenetic Model of Internet Addiction in Adolescence Based on Early Emotion Regulation

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Several etiopathogenetic models have been conceptualized for the onset of Internet Addiction (IA). However, no study had evaluated the possible predictive effect of early emotion regulation strategies on the development of IA in adolescence. In a sample of $N = 142$ adolescents with Internet Addiction, this twelve-year longitudinal study aimed at verifying whether and how emotion regulation strategies (self-focused versus other-focused) at two years of age were predictive of school-age children's internalizing/externalizing symptoms, which in turn fostered Internet Addiction (compulsive use of the Web versus distressed use) in adolescence. Our results confirmed our hypotheses demonstrating that early emotion regulation has an impact on the emotional-behavioral functioning in middle childhood (8 years of age), which in turn has an influence on the onset of IA in adolescence. Moreover, our results showed a strong, direct statistical link between the characteristics of emotion regulation strategies in infancy and IA in adolescence. These results indicate that a common root of unbalanced emotion regulation could lead to two different manifestations of Internet Addiction in youths and could be useful in the assessment and treatment of adolescents with IA.

1. Introduction

In the last decade, several studies depending on different theoretical frameworks have focused on Internet Addiction (IA) in adolescence [1–3]. The availability of new media and the ever-growing number of youths engaging worldwide in online activities have brought to the fore the urgent need in research for the individuation of their potential negative consequences and of the factors predicting over- or misuse of the Web. The clinical features of behavioral problems related to Internet use have been labeled in several different ways, including *Internet Addiction disorder* [4], *pathological Internet use* [5], *specific or generalized pathological Internet use* [6], and *problematic Internet use* [7]. Despite not recognizing it as an actual diagnosis, the American Psychiatric Association (APA) has recently indicated the *Internet Use Disorder* (IUD) as a clinical condition worth further studies, in the fifth edition of the Diagnostic and Statistical Manual

for Mental Disorders [8], proposing it as a form of addictive disorder, with the following criteria: (a) a loss of control over the behavior, (b) conflict (internal and interpersonal), (c) preoccupation with the Internet, (d) using the Internet to modify mood, and (e) withdrawal symptoms [9].

1.1. Etiopathogenetic Models. Several etiopathogenetic models have been conceptualized for the onset of Internet Addiction [10]. Scholars focusing on neurobiology and neuroimaging studies have posited that adolescents are at risk of developing IA due to their incomplete neurobiological maturation resulting in their only partially effective cognitive control [11] and reduced boundary setting skills [12]. Some authors have demonstrated a diminished inhibitory control [13] connected with an altered activity in the anterior and posterior cingulate cortices [14] and a reduced frontostriatal top-down control. Because of these neurobiological alterations, adolescents could fail in moderating their use of

the Internet experimenting an overwhelming impulse to indulge in online activities (which, on the other hand, are posited to highly activate the reward circuitry [15]). With regard to the functionality of neurobiological connections in adolescents' brains, it has been suggested that youths with IA show a reduced functional connectivity in the circuits joining cortical and subcortical regions, which regulate patterns and behavioral schemes and whose malfunction could lead to a tendency to act as a limited repertory of activities, potentially leading to rituals and maladaptive habits (such as misusing the Web). Other authors have proposed a "component model," that is based on symptoms and encompasses neurobiological and psychosocial risk factors [16] or a neuroendocrinological model [6, 17, 18]. Yet another branch of literature, mostly in the attachment theory framework [19, 20], has suggested that stressful or traumatic experiences in the first years of life, dissociative mechanisms, and preexisting psychopathology could be at the basis of adolescents' IA [21, 22]. Finally, a model incorporating a neurobiological and cognitive-behavioral approach [6] proposed that Internet Addiction could be fostered by distal or proximal causes. The former incorporates preexisting psychopathology (e.g., anxiety, depression, and substance dependence), whereas the latter relates to individual maladaptive cognitions, so that the misuse of the Web could represent a compensatory strategy to cope with unpleasant feelings of anxiety, depression, loneliness, inadequacy, or frustration [2].

1.2. The Present Study. The present study aimed to fill a gap in the literature, adopting a Dyadic-Systemic framework and referring to the concept of *early* emotion regulation, which to our best knowledge has never been used as etiopathogenetic hypothesis for Internet Addiction in adolescents (although it has been used to account for substance dependence [23]). The Dyadic-Systemic model focuses on intersubjective interactions between the child and his caregiver and on the impact of the quality of his affect regulation processes on the development, from childhood to adolescence and adulthood [24]. In fact, affect regulation has been defined as "the process of initiating, maintaining, modulating, or changing the occurrence, intensity, or duration of internal feeling states and emotion-related physiological processes [...] often achieved through effortful management of attention [...] and cognitions that affect the interpretation of situations [...] as well as through neurophysiological processes" [25]. Schore posited that "the core of the self lies in patterns of affect regulation that integrate a sense of self across state transitions, thereby allowing for a continuity of inner experience" [26]. Conventionally, research has observed mother-child interactions through video-recorded sessions, registering spontaneous and mutual contingency between them and reciprocal regulation of dyadic emotional communication [27–29]. According to this framework, mothers interpret child's emotional signals and adjust their affective states providing stimulation, while regulating the intensity of offspring arousal. On their part, children synchronize with their mothers' affects being reactive to their stimulation and reacting contingently to maternal emotions (this concept has been defined as *mutual interactive regulation*; [30–32]).

In general, the quality of mother-child interactions has been posited as the key precursor of children's ability to regulate their inner affective states later in life. While this approach has the merit of extracting one, easily interpreting predictive index of adaptive or maladaptive child's development (the quality of emotional-behavioral exchanges), it nonetheless brings the risk of overlooking the possible predominance of either self-regulation or other based regulation processes in the child. In spontaneous dyadic interactions, in fact, these two factors are both continuously active, but the *balance* between them may shift, due to specific characteristics of the partners of the dyadic systems. For example, an individual characteristic of the child (e.g., difficult temperament) can negatively influence the maternal capacity of interpreting and consistently responding to offspring signals or requests by *interacting with* psychopathological symptoms in the mother (e.g., depressive or withdrawal symptoms).

The adaptive balance between self-regulation and other regulation processes determines the formation of the self, the personal sense of self-efficacy and self-esteem, and above all the possibility for the subject to form and maintain intimate bonds [32]. Moreover, according to this model, this equilibrium prepares to the possibility for the individual of coping with loneliness and negative feelings [33]. Conversely, an excessive other based regulatory action in the child may lead to an internalized state of hypervigilance, whereas predominance of self-regulation (due to a lack of the caregiver's interactive sensitivity) may orientate the child towards the opposite extreme of withdrawal and inhibition. Previous literature has already suggested that both in adolescence and in adulthood an impaired capacity of regulating negative affects could contribute to the onset of Internet Addiction. On the other hand it is sensible to hypothesize that emotion regulation processes in youths and adults may be predicted by emotion regulation strategies in childhood [34]. Thus, in this study we took into account the children's behavioral strategies operated at two years of age aimed at reducing negative feelings and their possible links to IA in adolescence.

2. Conceptual Model and Hypotheses

In particular, in this study we examined whether and how emotion regulation strategies (self-focused versus other-focused) at two years of age were predictive of children's internalizing/externalizing symptoms measured when youths were eight years old, which in turn fostered Internet Addiction (compulsive use of the Web versus distressed use) at fourteen. We hypothesized two main maladaptive pathways, so that Hypothesis 1 was as follows: self-focused strategies tended to predict internalizing children's symptoms, which in turn predicts distressed use of the web through Hypothesis 2, which was as follows: other-focused strategies tended to predict externalizing children's symptoms, which in turn predict compulsive use of the Web.

The proposed conceptual model is shown in Figure 1.

3. Participants and Procedure

The study is part of a larger research that has been carried over thanks to the collaboration of public mental health centers

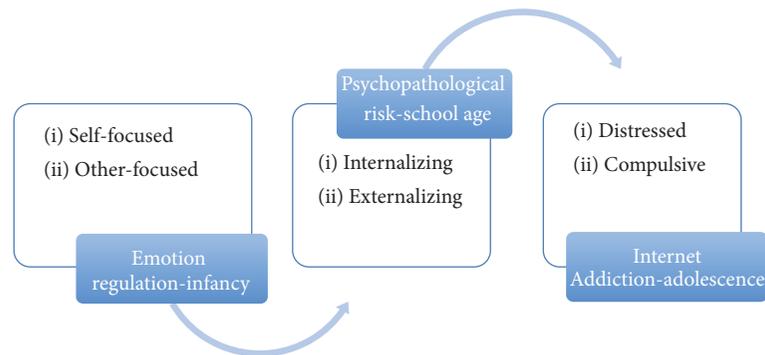


FIGURE 1: Conceptual model.

in Italy. The study was approved by the ethics committee of the Psychology Faculty at Sapienza, University of Rome (number: 2005-12), before the start of the study, and was in accordance with the Declaration of Helsinki. These centers had been operating on the territory since 2005 (and they are still operating) implementing prevention and intervention programs for the general population. A longitudinal protocol over three assessment points (2, 8, and 14 years of age of the child) is applied to the families attending these programs and it includes the video-recorded observation of parent-infant interaction in the first years of life to assess children's affect regulation strategies and the screening of mothers, fathers, and children's psychopathological risk at three waves of follow-up. This protocol is intended for the identification of at risk families (due to maladaptive interactive exchanges and/or psychopathological risk either of the child or the parents), so that the clinical services typically propose psychological and/or pharmacological intervention to the families.

In 2016 a group of $N = 142$ adolescents (mean age = 13.8; SD = 2.3) suffering from Internet Addiction without comorbidity were selected from the above population and included in this study. Video-recordings and psychometric measures belonging to families with adolescents with IA were selected from the database and considered for this study. All youths in this clinical population who had been diagnosed for IA without comorbidity were included in this study (in the general sample comorbidities were ADHD, 6.2%; social anxiety disorder, 5.3%; obsessive compulsive personality disorder, 9%; borderline personality disorder, 3%; eating disorders, 4.2%; gambling, 2.6%; and antisocial disorders, 4.7%); families with parents with a referred psychiatric diagnosis were excluded. The families recruited for this study were not included in any treatment plan (because they refused to pursue one or could not follow one due to geographical distance from the mental health centers) but they had an adolescent with an identified Internet Addiction. Data from parental psychopathological risk and from father-child interactions in this subsample of youths with IA were not available or they were incomplete. Thus, in the present study we considered only data coming from mothers and parental psychopathological risk was not considered. Starting in 2005, families were visited at their homes when children

were 2, 8, and 14 years old (T1; T2; T3). At T1, based on previous research [35–37], toddlers' behavioral strategies for emotion regulation were observed during 8 minutes parent-child interactions; at T2, mothers were given the Child Behavior Checklist (version 6-18; [38]); at T3, a clinical interview was conducted with youths based on the criteria of Beard and Wolf [39] to diagnose Internet Addiction and the Generalized Problematic Internet Use Scale 2 (GPIUS2; [40]).

3.1. Measures

3.1.1. Early Emotion Regulation. At T1, based on previous research [35], toddlers' behavioral strategies for emotion regulation were observed during 8 minutes parent-child interactions. Mothers were instructed to capture the attention of their offspring with a toy (unfamiliar to the child) and to begin a play interaction. After five minutes, however, mothers and fathers were told to cease the interaction and start reading a paper. This was intended to create a state of mild distress in the children, so that their affect regulation strategies could be observed. After three minutes, the mothers were instructed to cease reading the paper and soothe the child, if needed. If the child was too upset, the recording was stopped and/or never initiated.

Toddlers' self-focused or other-focused strategies were identified and used for the scoring. The scoring was realized including key children and mothers' events, as defined in the literature for mother-infant interactions [41, 42]. Therefore, only clearly discernable and discrete behaviors were considered (smiles, grimace, emission of words or sounds, cry, self-other directed or reciprocal touch, and intentional and purpose-directed movements in the room). All video-recordings were watched by clinical psychologists, blind to the aim of this study, to verify whether the children showed signs of distress. No recording needed to be interrupted due to excessive distress of the child. Toddlers' behaviors were scored on a presence/absence basis. Coders were trained psychologists, experts of the field. Toddlers' other-focused strategies included looking at the mother, gesturing to the mother, and talking to the mother. Self-focused strategies included visual distraction (looking away from the parent

TABLE 1: Descriptive statistics and correlation matrix.

	M	SD	2	3	4	5	6	7
(1) Self-focused ER	.39	.11	.12	.11	.42**	.09	.61**	.13*
(2) Other focused ER	.45	.15	-	.09	.13*	.39	.08	.59**
(3) Balanced ER	.21	.18	-	-	.12	.06	.08	.05
(4) Inter. symptoms	25.3	2.9	-	-	-	.14*	.43**	.11
(5) Extern. symptoms	22.1	3.1	-	-	-	-	.12	.57**
(6) Distressed IA	4.2	1.6	-	-	-	-	-	.12
(7) Compulsive IA	3.98	1.2	-	-	-	-	-	-

* $p < .05$. ** $p < .001$.

and/or from the toy), talking to self, self-soothing behaviors, and holding the toy without playing with it. After scoring the strategies, the coders assigned the video-recording to one of the following categories on the basis of the mean of child's observed behaviors: predominantly self-focused; predominantly parent-focused; balanced (with an equilibrium between self- and parent-focused strategies).

3.1.2. Internalizing/Externalizing Symptoms. At T2 mothers were administered the Child Behavior Checklist, version 6-18 (CBCL; [38]) (Italian validated version; [43]). It is a self-administered questionnaire containing 118 items. Parents respond to the items on a three-point scale (0 = not true, as far as you know, 1 = somewhat or sometimes true, or 2 = very true or often true) based on the past 6 months. The measure taps eight empirically based syndromes (anxious/depressed, withdrawn/depressed, somatic complaints, social problems, thought problems, attention problems, rule-breaking behavior, and aggressive behavior) and three broad-band scales (internalizing, externalizing, and total problems). In this study, Cronbach's alpha value was $\alpha \geq 0.88$ and we considered the two main syndrome scales for internalizing/externalizing problems.

3.1.3. Internet Addiction. At T3 IA was detected by the psychologists and psychiatrists operating in the mental health service on the basis of the criteria proposed by Beard and Wolf [39]. All the following criteria (1-5) must be fulfilled and the subject must (1) be preoccupied with the Internet (thinking about previous online activity or anticipating the next online session); (2) need to use the Internet with increased amounts of time in order to achieve satisfaction; (3) have made unsuccessful efforts to control, cut back, or stop Internet use; (4) be restless, moody, depressed, or irritable when attempting to cut down or stop Internet use; (5) have stayed online longer than originally intended. Moreover, at least one of the following issues must be present and the subject must (1) have jeopardized or risked the loss of a significant relationship, job, and educational or career opportunity because of the Internet; (2) have lied to family members, therapist, or others to conceal the extent of involvement with the Internet; (3) have used the Internet as a way of escaping from problems or of relieving a dysphoric mood (e.g., feelings of helplessness, guilt, anxiety, and depression). Furthermore, adolescents were administered the Generalized

Problematic Internet Use Scale 2 (GPIUS2 [40]), which is a revised and updated version of the 15-item Generalized Problematic Internet Use Scale [44]. The GPIUS2 taps four core components: (1) POSI (i.e., preference for online interaction; example item: "Online social interaction is more comfortable for me than face-to-face interaction"); (2) Mood Regulation (example item: "I have used the Internet to make myself feel better when I was down"); (3) Deficient Self-Regulation (example items, resp.: "I find it difficult to control my Internet use"); and (4) Negative Outcomes (example item: "I have missed social engagements or activities because of my Internet use"). For the aims of this study and on the basis of Kandell [45] and Hirschman [46] the four dimensions were aggregated into two scales: distressed use of the Web (incorporating dimensions 1 and 2) and compulsive use of the Web (incorporating dimensions 3 and 4).

4. Results

Descriptive statistics for all variables are presented in Table 1.

To validate our hypotheses the theoretical model presented in Figure 2 was tested using a latent variable framework.

Self-focused and other-focused emotion regulation strategies were defined as latent variables by using their indicators to account for measurement error. Due to the number of items in the measurement instruments in relation to the number of subjects, all other variables were posited as a single indicator latent variable following Bollen and Long [47] recommendation. To account for measurement error in these cases and to obtain more precise estimates of structural parameters, error variance for each single indicator was fixed at one minus the sample reliability estimate of the variable, multiplied by its sample variance. Mplus 6.12 was used to test this model.

After examination of the Modification Indices, the hypothesized model was corrected to incorporate a direct effect from emotion regulation strategies (self-focused and other-focused) to Internet Addiction (distressed and compulsive). The revised model (Figure 2) provided an excellent fit to the data as revealed by the fit indexes: $\chi^2(57) = 71.131$, $p = .18$; CFI = .94; TLI = .98, RMSEA = .000 (CI = .000-.0681), $p = .84$; SRMR = .072. As shown in Figure 2, results of this model confirmed our hypotheses but it also showed that self-focused and other-focused emotion regulation strategies (unbalanced

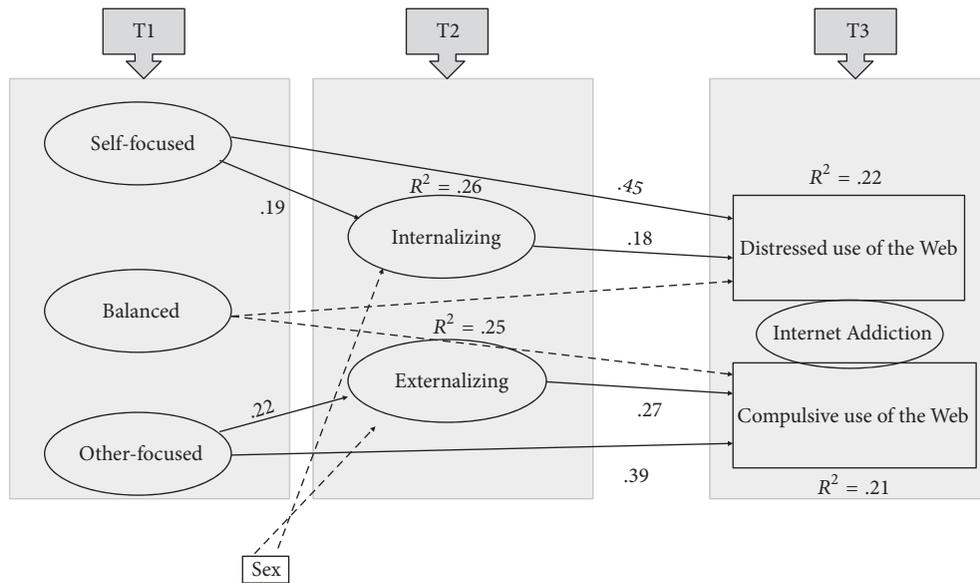


FIGURE 2: Longitudinal model.

strategies) directly predicted, respectively, distressed and compulsive Internet Addiction. Moreover, balanced emotion regulation strategies showed a negative association with IA. With regard to Hypothesis 1, self-focused strategies predicted internalizing children’s symptoms, which in turn predicted distressed use of the Web; with regard to Hypothesis 2, other-focused strategies predicted externalizing children’s symptoms, which in turn predicted compulsive use of the Web. Overall, predictors explained 26% of the variance in internalizing, 25% of the variance in externalizing, 22% of distressed IA, and 21% of compulsive IA.

5. Discussion

In a sample of adolescents with Internet Addiction, this longitudinal study aimed at verifying whether and how emotion regulation strategies (self-focused versus other-focused) at two years of age were predictive of children’s internalizing/externalizing symptoms measured when youths were eight years old, which in turn fostered Internet Addiction (compulsive use of the Web versus distressed use) at fourteen. Our hypotheses were that two main maladaptive pathways would be present. One would characterize adolescents who showed self-focused strategies of emotion regulation when they were two years old and subsequently presented internalizing symptoms at eight years of age; at fourteen years of age, these individuals had been hypothesized to show a distressed subtype of Internet Addiction. The other maladaptive pathway would differentiate youths who showed other-focused strategies of emotion regulation when they were two years old and successively presented externalizing symptoms at eight years of age; at fourteen years of age, these individuals had been hypothesized to show a compulsive subtype of Internet Addiction.

Although a vast literature has posited that many factors can contribute to Internet Addiction, including individuals’

difficulty in coping with stress and developmental challenges [48–50] and controlling social anxiety [51–53] and escapism from unpleasant feelings which cannot be controlled [53–55], no study to our best knowledge has specifically addressed the central role of early emotion regulation, measured as early as in the first two years of life. Actually, emotion regulation has been considered in this field but limitedly to the weight of concurrent ER in adolescents or adults, whereas no attention has been given to the predictive power of this variable when measured in early childhood. Similarly, while several studies have investigated the role of concurrent psychopathological risk in individuals with IA, only a few scholars have granted attention to the possible predictive power of psychological problems for the onset of this disorder and they did not consider psychopathological symptoms in school-age children, concentrating instead on adolescents. This is surprising, given that emotion regulation is increasingly being incorporated into models of psychopathology [56] and great number of studies in the field of developmental psychopathology addressed the negative outcomes of emotion dysregulation in infancy on emotional-behavioral functioning in children and on its subsequent links with other clinical conditions (e.g., depression, anxiety, substance addiction, and attachment insecurity) [57, 58]. It must be said, however, that IA is a relatively novel clinical manifestation and this branch of research will be able to count on results from new longitudinal studies.

In this study, results confirmed our hypotheses demonstrating that early emotion regulation has an impact on the emotional-behavioral functioning in middle childhood (8 years of age), which in turn has an influence on the onset of IA in adolescence. Moreover, our results showed a strong, direct statistical link between the characteristics of emotion regulation strategies in infancy and IA in adolescence. In our sample, infants who predominantly used self-focused strategies to regulate negative emotions were at higher risk of

developing a distressed IA subtype, whereas young children who primarily used other-focused strategies to adjust to negative emotions were at higher risk of developing a compulsive IA subtype. These results are consistent with the literature in the field of emotion regulation, as defined by authors considering its relational component (rather than its relations with individual characteristics). In this view, excessive self-focused regulation in infancy can be related to withdrawal symptoms later in life [30] and impaired emotion regulation in general can be associated with a difficulty in structuring and maintaining intimate relationships with others. It can also deepen the impact of a negative view of self-embedded in the insecure internal working models in adolescence and foster difficulties in identifying and describing feeling [59], which in turn can predict the overuse of the Web to seek virtual contacts and technology-mediated interactions that can be perceived as easier to control. On the other hand, preponderant other-focused ER strategies in infancy are proposed to foster an emotional hyperactivation that can be also defined as a hypervigilance [60, 61]. It is known that one of the issues characterizing IA is the fear of missing out, that is, the preoccupation of being left out of interesting, important, or relevant circles of information and relationships. In this view, our results suggest that this preoccupation could be related to an early unbalance in the emotion regulation strategies, so that the subject has not learned to rely on himself/herself to regulate negative feelings, using others instead for this aim.

From a psychodynamic standpoint, these two configurations (distressed and compulsive Internet Addiction) are two faces of the same coin and they serve the same psychological need. The distressed subject (formerly a self-focused child with internalizing symptoms) develops an addiction to the Internet in the attempt to emotionally interact with others (against his/her withdrawal tendency). The subject who uses the Internet in a compulsive way, instead, seeks comfort in the obsessive contact with virtual others to strengthen and/or define his self-identity, which had not fully developed due to the continuously other-oriented early emotion regulation strategies. This conceptualization is derived from Hirschman's theory [46] that posited that a person susceptible to addiction might fall into two subtypes: distressed and sociopathic. Distressed subjects preferably use an external locus of control (due to a sense of self-doubt, incompetence, and personal inadequacy) and this tendency results in being easily subjective to environmental factors (e.g., addictions). Sociopathic subjects, instead, have sensation-seeking tendencies and experience the need for immediate sensory gratification. In such a conceptualization, both types of subjects use the addiction to conserve a stable sense of self. We propose that the same mechanism operates in subjects with Internet Addiction when they showed unbalanced early emotion regulation strategies. The approach indicating two main types of Internet addicted adolescents could be useful in the assessment and treatment of youths with this clinical manifestation; on one hand, a clinician could encounter subjects who are apparently well adapted to the environment, have several friends, have good academic results, and are still overusing the Web. We propose that these adolescents could have experienced an unbalance in their

early emotion regulation and could have stably used other-oriented regulations. Therefore, they could compulsively use the Internet in an attempt to experience a sense of self-regulation (which had been lacking in their childhood). This hypothesis is in line with Schimmenti and Caretti's seminal work [59]. These authors posited that a deficit in emotional self-regulation might lead to a dangerous use of dissociative mechanisms, activated as to defensively exclude painful mental states, eventually predicting the withdrawal into technological addictions.

On the other hand, other subjects with IA could appear as isolated and withdrawn; these adolescents might have suffered an unbalance in their emotion regulation strategies in the sense of a stably self-oriented regulation, and they could overuse the Web to seek an external means of regulation, which they lacked in their childhood. In both cases, adolescents could over- or misuse the Internet in an attempt to repair the unbalanced emotion regulation strategies.

This study has some limitations. First, we did not assess parental psychopathological risks, which have been widely indicated as key predictive factors for the development of children and adolescents' maladaptive psychological functioning. In particular, we could not include data on children's emotion regulation strategies observed during father-child interactions (although they are included in the original protocol), due to incomplete or unavailable data. Furthermore, the homogeneity of the sample, in terms of cultural, geographical, and socioeconomic status, limits replication of the study in other countries or cultures.

Notwithstanding these limitations, this study can have useful clinical implications in that it may help recognize the "core" underpinning mechanism of IA in adolescents (impaired emotion regulation) while planning prevention and intervention programs based on the specific clinical manifestations of the patients, which can be different. Some youths can show positive symptoms, have many friends, and have apparently good adaptation to the environment but still manifest a difficulty in regulating their use of the Web (and of social network in particular, as these allow them a continuous control over peers); some others can rather show negative symptoms, have a few or none significant relationship with peers, and have poor academic results, tending to isolate themselves and fall into technological *psychic retreats* [59, 62], which they use as shelters against unpleasant feelings. In both cases, however, clinicians should consider very carefully the deconstruction of such strategies, because they can account for a defensive attempt to compensate weakness of the adolescent self. Therefore, preventive or therapeutic programs based on abrupt prohibition of using the Internet (or radically reducing its utilization) could cause an emotional breakdown.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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