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The Relationship Between Compulsive Internet Use and Symptoms of Depression and Anxiety in Adolescence

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Abstract - Difficulties in managing one's habits of internet use have been the focus of much clinical and scientific interest in the past twenty years. However, their definition, clinical nature, and relationships with other relevant concepts, remain a matter of controversy. The aim of this study was to examine the relationship between compulsive internet use (CIU) and symptomatology related to depression and anxiety among adolescents. The sample consisted of 1320 primary and secondary school students aged 11 to 18 years. Problematic patterns of internet use were assessed using the Compulsive Internet Use Scale, while depression and anxiety symptoms were measured using Beck Youth Depression Inventory and Beck Youth Anxiety Inventory. The results have shown that adolescents who report more compulsive patterns of internet use also show higher levels of depression and anxiety symptoms. The findings contribute to the understanding of problematic internet use in adolescents and its relationship with internalizing emotional difficulties, which suggests valuable implications for the development of prevention and intervention programs within the adolescent population.

Key words: Internet, addictive behavior, anxiety, depression, adolescents

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Introduction

Internet has introduced a new dimension to the environment in which children and youth master their developmental tasks. For adolescents internet has become an important source of leisure activities [1], and the leading mean of communicating with peers

[2-4]. Although it has created many opportunities for children and adolescents, it also presents a source of significant risks, among which this study has focused on compulsive internet use. Despite the lack of consensus among researchers on the nature, terminology and definition of the underlying concept [5], numerous authors agree that internet users can develop problematic patterns of internet use, characterized by obsessive and compulsive behavior negatively affecting daily functioning [6-15].

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This study relies on the concept of compulsive internet use [16], developed by Meerkerk et al. [17] based on diagnostic criteria for dependence and pathological gambling [18], conceptualization of behavioral addictions formulated by Griffiths [19], and the results of previous research conducted by Meerkerk, Lalan, & Eijnden [20]. The authors propose that the source of addictive potential is not internet itself, but rather certain online activities, the use of which results in compulsive internet use [16]. Meerkerk et al. [17] have defined compulsive internet use as a one-dimensional phenomenon, which consists of: 1) loss of control, defined as spending more time online than intended and unsuccessful attempts to diminish use of internet; 2) mental and behavioral preoccupation with internet use (thinking about internet when offline and preference for internet use above other activities), 3) withdrawal symptoms, defined as feelings of unrest and agitation when an individual is unable to go online; 4) using internet to relief negative affective states, 5) conflict with others and intrapersonal conflicts (guilt and remorse).

Adolescents have been identified as a group at heightened risk for development of problematic internet use [21, 22]. Their vulnerability has been attributed to lack of emotional and psychological maturity [23], insufficiently developed self control and cognitive abilities [24], heightened sensitivity [16], and lack of online parental monitoring [25].

Excessive and/or compulsive patterns of internet use among children and youth have been linked to diminished psychological well-being, in terms of both emotional [4, 26-32] and behavioral difficulties [26, 32, 33]. The cognitive-behavioral model of pathological internet use (PIU) by Davis [34-38], views

psychosocial problems as components in its etiology, suggesting that mental health difficulties make the individual more susceptible to PIU, by contributing to the development of maladaptive cognitions about self and the world, which, joined with lack of social support and social isolation, lead to the development and maintaining of PIU, and are further strengthened through PIU related behaviors, such as social isolation due to excessive time spent online. Although Davis' [34] model does not consider the reverse effect of the PIU symptoms and maladaptive cognitions on psychosocial problems, individuals with diminished psychosocial wellbeing seem to be inclined to developing a preference for online social interaction, which is connected with development of negative outcomes associated with problematic internet use [35-37]. Further, negative outcomes of compulsive internet use, such as neglect of work, school, or significant relationships use, have been shown to contribute to impairment in individuals' psychosocial wellbeing [39, 40].

Based on critical review of current research on the relationship between pathological internet use and comorbid psychopathology, Carli et al. [41] conclude that depression shows the strongest correlation with pathological internet use. Depression related symptomatology has been linked to problematic patterns of internet use in both cross-sectional [29, 32, 42-44] and longitudinal studies [22, 45, 46]. However, multiple studies contradict the predominant conclusions [47-49], which suggests the need for further research, and calls for clarification of the underlying constructs and moderating variables, which could explain the discrepancies in the findings.

Research on the relationship between anxiety and problematic internet use is predomi-

nantly focused on social anxiety, which has systematically been linked to problematic internet use [32, 35, 48-51]. However, research focused on anxiety symptomatology in general in adolescent population is scarce and inconsistent. Durkee [42] and Xiuqin et al. [31] have found that adolescents with problematic internet use patterns show higher levels of anxiety, which has also been found in college students [44, 52]. However, in a prospective study conducted by Lam & Peng [46] no significant relationship between pathological use of the internet and anxiety at the time of follow up was observed, suggesting no effect of pathological internet use on the wellbeing of participants.

The current body of research is also marked by the discrepancies among numerous concepts developed to describe maladaptive patterns of internet use, thus limiting the validity and comparability of previous findings. Further, given that a significant number of studies has been conducted in a different cultural setting, it is unclear whether obtained results can be generalized on Croatian adolescents. In this regard the present study contributes to previous research as the first study on compulsive internet use conducted on a large nation wide sample of Croatian adolescents.

The aim of this study was to determine whether depression and anxiety symptoms can be predicted based on the level of compulsive internet use among adolescents. It was hypothesized that emotional difficulties will be more pronounced among adolescents who exhibit more compulsive patterns of internet use. Given that levels of depression and anxiety symptoms have been shown to change through childhood and adolescence [53-55], differ among adolescent boys and girls [54, 56], and vary depending on school

performance [54, 57, 58], the effects of these variables have been controlled.

Methodology

Subjects

Research was conducted on a convenient sample of 1320 primary and secondary school (both grammar and vocational) students from different Croatian regions. The participants included children from 5th grade of primary schools to 2nd grade of secondary schools, ranging from 11 to 18 years of age ($M = 14.57$; $SD = 1.67$), and relatively equable in gender (43% of boys, 57% of girls).

Materials and methods

Compulsive Internet use. The level of addiction related behavior and experiences in participants' internet use was assessed using the Compulsive Internet Use Scale (CIUS) [17]. CIUS is a self-report measure, scored on a five point Likert scale ranging from 0 ("never") to 4 ("very often"), which consists of 14 questions focused on maladaptive patterns of internet use as defined by Meerkerk et al. [17]. Previous studies have shown CIUS to have good factorial stability across time and samples, high internal consistency and high correlations with concurrent and criterion variables [17]. Current study has confirmed the single factor structure of the scale, with items ranging from moderate to strong factor loadings (.599 to .759), as well as high internal consistency (Cronbach $\alpha = .912$).

Anxiety and depression. Children's emotional difficulties were evaluated using Beck Youth Depression Inventory (BDI-Y) and Beck Youth Anxiety Inventory (BAI-Y) [59]. Both instruments are 20 item self-report measures, designed to evaluate emotional impairment

of children between ages of 7 and 18. The children are asked to describe the frequency of anxiety and depression related thoughts, feelings and behaviors during the past two weeks, on a four point scale ranging from 0 (“never”) to 3 (“always”). For the purposes statistical analyses sum of scores on each of the traits were used, with higher results indicate greater levels of symptomatology. Both instruments have shown high internal consistency and high convergent validity [59, 60].

Sociodemographic data. The participants also answered a short sociodemographic questionnaire, containing questions about gender, age and school performance, measured as grade average at the end of semester.

Procedure

The data was gathered within the framework of a research project on experiences and behaviors of children and youth on Facebook social network, conducted by Brave Phone and Child and Youth Protection Center of Zagreb in 2013. Research was approved by the Ministry of Social Politics and Youth and the Ethical Committee of Child and Youth Protection Center of Zagreb. Written con-

sent of headmasters and parents was obtained, and the participation of children was voluntary. The questionnaires were administered in a group setting by trained volunteers. Research was conducted in accordance with Ethical codex of research with children [61].

Results

Descriptive statistics and intercorrelations are presented in Table 1. Adolescents with higher levels of CIU exhibited higher levels of symptomatology related to depression ($r = .415$; $p < .01$) and anxiety ($r = .369$; $p < .01$). CIU also showed correlations with age, gender and school performance, albeit very weak, suggesting older ($r = .169$; $p < .01$) and female adolescents ($r = .123$; $p < .01$), as well as those with lower grades ($r = -.172$; $p < .01$), to be at risk for CIU. An examination of correlations revealed that intercorrelations between independent variables were very weak.

The contribution of CIU in predicting depression and anxiety among adolescents was examined by conducting two stage hierarchical multiple regressions, separately for depression and anxiety as dependent variables.

Table 1. Descriptive statistics and intercorrelations (N = 1317)

Variable	M	SD	1.	2.	3.	4.	5.	6.
1. Gender ^a	1.57	0.50	1					
2. Age	14.57	1.67	.037	1				
3. School performance ^b	4.25	0.69	.106***	-.322***	1			
4. Compulsive Internet use	29.52	11.13	.123***	.168***	-.17***	1		
5. Anxiety	19.17	9.42	.261***	.042	-.116***	.368***	1	
6. Depression	11.42	8.95	.249***	.031	-.128***	.415***	.718***	1

* $p < .05$, ** $p < .01$, *** $p < .001$.

^a1 = male, 2 = female.

^b1 = insufficient, 2 = sufficient, 3 = good, 4 = very good, 5 = excellent.

Table 2. Summary of hierarchical regression analysis in predicting depression (N = 1319)

Predictors	Standardized Regression Coefficients (β)	
	Step 1	Step 2
Gender ^a	.268***	.217***
Age	-.033	-.077**
School performance ^b	-.167***	-.110***
Compulsive Internet use		.382***
Model summary		
R	.295	.474
Adjusted R ²	.085***	.222***
Delta R ²	.087***	.137***

* $p < .05$, ** $p < .01$, *** $p < .001$.

^a1 = male, 2 = female.

^b1 = insufficient, 2 = sufficient, 3 = good, 4 = very good, 5 = excellent.

Table 3. Summary of hierarchical regression analysis in predicting anxiety (N = 1320)

Predictors	Standardized Regression Coefficients (β)	
	Step 1	Step 2
Gender ^a	.277***	.232***
Age	-.015	-.054*
School performance ^b	-.152***	-.102***
Compulsive Internet use		.332***
Model summary		
R	.299	.439
Adjusted R ²	.087***	.190***
Delta R ²	.089***	.104***

* $p < .05$, ** $p < .01$, *** $p < .001$.

^a1 = male, 2 = female.

^b1 = insufficient, 2 = sufficient, 3 = good, 4 = very good, 5 = excellent.

In the first stage of both models the entered predictor variables included gender, age and school performance, which were considered

to be control variables, while at stage two CIU was included among the predictor variables (*Table 2* and *Table 3*).

The hierarchical multiple regression revealed that at stage one, gender, age and school performance contributed significantly to the prediction of both depression ($F(3,1315) = 41.740, p < .001$) and anxiety ($F(3,1316) = 42.936, p < .001$), accounting for equal levels (9%) of both depression and anxiety symptoms. In the second stage of the models, compulsive internet use was shown to predict both depression ($F(4,1314) = 95.005, p < .001$) and anxiety ($F(4,1315) = 78.556, p < .001$) levels above and beyond control variables, explaining an additional 14% of variation of depression and 10% of variation in anxiety symptomatology. In both models, CIU was the strongest predictor, positively correlated with depression ($\beta = .382; p < .001$) and anxiety ($\beta = .332; p < .001$), suggesting that adolescents who exhibit more compulsive patterns of internet use show higher levels of depression and anxiety symptoms.

Discussion

Research on the relationship between excessive and/or compulsive internet use and psychological wellbeing has been strongly influenced by discrepancies among conceptual definitions of the underlying construct. This study relied on the previously described concept of compulsive internet use, which has been widely researched, and is accompanied by a psychometrically sound measure [16, 17]. The aim of this study was to determine whether anxiety and depression in adolescents can be predicted based on compulsive internet use. As hypothesized, compulsive internet use was linked with higher levels of anxiety and depression symptoms.

An overview of available research suggests that the inconsistency of previous findings

could be attributed to differences in the operationalization of the underlying construct. It supports the notion that is not the mere amount of time spent online [47-49] but the compulsive and/or addictive nature related to heavy internet use, that is connected to diminished emotional wellbeing [33, 44, 62-65].

Regarding the relationship of CIU and anxiety, unlike previous research, which has mainly focused on anxiety related to social functioning, the present study examined the relationship of compulsive internet use and cognitive, emotional and behavioral aspects of anxiety in general. Findings suggest that other aspects of anxiety (e.g. such as worrying about one's physical and psychological integrity, school performance or future, physiological symptoms of anxiety or specific fears), can also be found among adolescents using internet in a compulsive manner, which is in accordance with findings of previous studies conducted on older samples [44, 52]. These results call for further research and development of the present theoretical model, which has viewed cyberspace merely as a facilitator of social interactions for shy and socially anxious individuals [66, 67], which stimulates preference for online communication and potentially leads to problematic patterns of internet use [36].

Current study does not allow conclusions about the causality of the relationship between emotional wellbeing and problematic internet use. Previous findings explaining this relationship are scarce, suggesting the need for further research. Some studies suggest that psychosocial problems contribute to the vulnerability in developing problematic, compulsive and/or addictive patterns of internet use [42, 64, 65], which is also suggested by the previously described cognitive-behavioral model of PIU [34].

However, although Davis` [34] model does not consider the reverse effect, several studies have indicated that PIU could increase the risk of diminished emotional well-being. In accordance with this hypothesis, Dong, Lu, Zhou and Zhao [40] have found that certain psychopathological disorders and traits, including depression and anxiety, occurred as outcomes of internet addiction disorder. Furthermore, negative outcomes of compulsive internet use, such as neglect of work, school, or significant relationships use, have been shown to contribute to impairment in individuals` psychosocial wellbeing [38, 68]. A longitudinal study by *Gómez-Guadix et al.* [68] has linked depressive symptoms with an increase in preference for online relationships, use of the internet for mood regulation, and negative outcomes, while present negative outcomes have predicted an increase in depressive symptoms, suggesting a bidirectional relationship.

Moreover, it is also possible that both phenomena may be different manifestations of one (underlying) psychological disorder or personality trait, such as obsessive-compulsive symptoms [40], deficient self regulation

or impulsivity [68, 69], or low emotional stability [30].

Despite the limitations, current findings have significant implications for the development of efficient prevention and intervention programs, as well as empirical value in the clinical setting. By connecting compulsive internet use with depression and anxiety, attention is drawn to the need to assess and address patterns of internet use and associated risks in adolescents seeking help for emotional difficulties, as well as addressing possible underlying or comorbid emotional difficulties in adolescents exhibiting problematic internet use. Further, these findings present the first national study conducted among Croatian adolescents, conducted on a large sample and contribute to the body of research focused on adolescent population, which has been shown to be vulnerable to problematic patterns of internet use.

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None

Conflict of interest

None to declare

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Odnos između kompulzivne uporabe interneta i simptoma depresije i tjeskobe u adolescenciji

Sažetak - Teškoće u upravljanju navikama korištenja interneta tijekom posljednjih dvadeset godina predmet su značajnog kliničkog i znanstvenog interesa. Međutim, njihova definicija, klinička priroda i odnosi s drugim relevantnim konceptima i dalje su područja obilježena neslaganjem. Cilj ovog istraživanja bio je ispitati odnos između kompulzivnog korištenja interneta (KKI) i simptomatologije povezane s depresivnošću i anksioznošću među adolescentima. U istraživanju je sudjelovalo 1320 učenika osnovnih i srednjih škola, u dobi od 11 do 18 godina. Problematični obrasci korištenja interneta procjenjivani su pomoću Skale kompulzivnog korištenja Interneta, dok je depresivna i anksiozna simptomatologija mjerena pomoću Beckovog inventara depresivnosti za mlade i Beckovog inventara anksioznosti za mlade. Rezultati pokazuju da adolescenti koji izvještavaju o kompulzivnijim obrascima korištenja interneta također pokazuju više razine depresivne i anksiozne simptomatologije. Nalazi doprinose razumijevanju problematičnog korištenja interneta kod adolescenata te

njegovog odnosa s internalizirajućim emocionalnim teškoćama, što predstavlja vrijedne implikacije za razvoj programa prevencije i intervencije namijenjenih adolescentskoj populaciji.

Ključne riječi: Internet, ovisničko ponašanje, anksioznost, depresivnost, adolescenti

