Original paper

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Risk Factors of Internet Addiction among Internet Users in Croatia: An Online Questionnaire Survey

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Abstract - This study aimed to examine the level of Internet addiction (IA) and characteristics of Internet usage in this (specific) sample of Croatian Internet users. We explored the likelihood of developing IA regarding personal characteristics and characteristics of Internet usage, and we aimed to examine the possibility of predicting the levels of IA based on psychological characteristics. About 35% of the respondents achieved the score above the cut-off value for determining the IA but the majority belonged in the category of mild addiction. The results showed that younger age ($F = 4.14$, $p = 0.007$), and male gender ($\chi 2 = 7.49$, $p=0.05$) can serve as risk factors for the development of IA. It has also been found that spending on the Internet more than 3 hours a day ($\beta = 0.33$, $p < 0.001$), along with poorer general health ($\beta = 0.25$, $p < 0.001$) and ineffective interpersonal styles (misanthropic $\beta= 0.17$, $p < 0.01$ versus philanthropic $\beta = 0.16$, $p < 0.01$), significantly contributed to the development of IA.

Key words: Internet addiction; Internet users; psychological characteristics; Croatia

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Introduction

Modern technology and the Internet provide many benefits for people today, including working from home, online shopping, entertainment, and communication with each other. However, it has also reduced the people's need for face-to-face communication and social interaction [1]. For that reason the Internet can contribute to the social isolation of people by separating them from other social contexts and changing the traditional patterns of social relations to virtual ones [2,3]. Excessive use of Internet can disturb family and romantic relationships, academic and occupational success [4]. Sleep patterns are often disturbed which reduces daily functioning, addiction leads to lack of exercise, back pain and eyes problems, psychological distress and even neurological complications [4-6]. In recent decades, since the trend of increasing Internet addiction (IA) has been observed, much research effort has been put into identifying intrapersonal and interpersonal/contextual factors that precede and/or follows IA.

The concept of IA became a growing social issue which is defined as an "overuse and uncontrolled need for the Internet usage which dominates within the youth across the globe" [4,6]. It is listed under the behavioural addictions that exclude use of psychoactive substances, but possess potential for the stimulation of the individual [7]. IA is not included in the new-

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est classifications system of mental disorders DSM-5 and ICD-11 [8,9]. The conceptualization of such disorders is still insufficiently uniform in countries around the world and transcultural, and that due to insufficient research in this field covering various aspects of Internet use, for now only Internet Game Addiction is included in DSM-5, in Chapter 3 [8,10].

The problem of IA has different proportions across nations and some countries like China, South Korea and Taiwan have even declared it as a significant public health problem [6,11]. According to meta-analysis which included 31 countries, the prevalence of IA is higher in Middle East countries and lower in north and east Europe [12]. Studies showed a higher prevalence of IA in countries with lower general life satisfaction, greater pollution, lower national income and where people spent a lot of time traveling to work [12].

According to Winkler and associates meta-analysis, IA in Europe and USA affects 1.5-8.2% of the general population [13]. The prevalence is higher among younger population, especially students and among male Internet users [13,14]. Studies also recorded some gender differences in IA. For instance, the prevalence of gaming addiction is higher among man, while social network addiction prevalence is higher among women [5].

Croatian Bureau of Statistics (2019) reports of an increase in Internet use in all age groups and increase in mobile network use [15]. The youngest population (16-24 years old) makes up the largest number of Internet users and the number of users decreases in proportion to their age [15]. The main reasons for using Internet are reading news, searching information, e-mailing, social networking and instant messaging [15]. There are not many studies of Internet addiction in Croatian population, and most of them are based on younger population. According to Croatian Institute for Public Health (2015) there are approximately 130 000 Internet addicted users, mostly in the age group of 20-30 years [16]. Croatian study of IA among high school students showed that 50% of students can't control their time spent online [17]. This study found symptoms of IA among high school students, which seems to be more pronounced among boys than among girls [17]. The recent study among Croatian adolescents reported some signs of IA among 35% of high school students and reported some gender differences in problems that come along with IA. Neglecting work and lack of self-control were found more pronounced in girls while social problems were more common among boys [18].

The emergence of IA is viewed from an interpersonal-contextual and/or intrapersonal perspective, with a more pronounced effect of intrapersonal factors [19,20]. Characteristics of Internet usage including time spent online (more than 10 hours daily), and types of Internet activities (downloading music, programs, movies, online shopping, online gaming) are connected with the higher levels of IA [21]. Contextual or social factors associated with family problems, parenting conflicts, poor parental support and stressful events also contribute to the development of IA [22,23].

Concerning IA, addressing the problems of individuals' mental health is of great importance. Numerous empirical evidences suggest that IA and mental health, measured by the General Health Questionnaire (GHQ) were negatively related and poor mental health seems to lay the groundwork for the IA [24-27].

Personality traits could also be predisposing factors for IA. Metaanalytic data show association of IA with all 5 dimensions of the Big Five questionnaire. Neuroticism is positively associated with the IA, while the openness, conscientiousness, extraversion and agreeableness show negative association with IA [28,29]. IA is also connected with the difficulties in the social interaction and isolation [30]. To our knowledge, no study has examined the relationship between interpersonal orientation and Internet addiction. According to the theoretical basis, the need for people and friendship indicate an orientation towards people (philanthropic orientation), while mistrust and social isolation (misanthropic orien-

tation) indicate an orientation against/from people [31,32]. Research findings imply that both styles of interpersonal orientation could increase motivation to overuse the Internet: people oriented toward social contacts are motivated to add online contacts to their already large network of offline friends, while socially isolated people may draw to the Internet for social interactions lacking in their offline or 'real' lives [33,34]. Accordingly, we assumed that both styles of interpersonal orientation would be predictive for IA development.

The main purpose of this study was to identify factors that contributed to vulnerability for IA. We aimed to examine the level of IA and characteristics of Internet usage in this (specific) sample of Croatian Internet users. Next, we explored the likelihood of developing an IA regarding both personal characteristics and characteristics of Internet usage. Finally, we aimed to examine the possibility of predicting the levels of IA based on psychological characteristics (mental health and interpersonal orientation).

Subjects and Methods

Subjects

The sample consisted of 310 participants of both genders (72.9% women and 17.9% men) aged from 18 to 72 years (M = 38.05, SD = 12.12). *The largest number of participants (32.9%) were in the age group 30-39 years, followed by 25.2% in the group 20-29 years, while 16-18% were in older groups 40-49 and 50-59, separately. The smallest number were distributed within the youngest (3.2%) (<20 years) or the oldest (>60 years) age category (4.8%). Most participants had higher (62.5%) and secondary (26.5%), while 11% of them had postgraduate education. There were no special inclusion criteria for participants, except a minimum age requirement of 18.

Methods

A correlational cross-sectional research design was used. The survey was performed publicly online at the Google docs platform among the general population during September and October 2020. The researchers distributed links to the survey via social networks.

The survey consisted of several questionnaires which assessed their personality characteristics and mental health status: The Internet Addiction Test-IAT, the most commonly used test for measuring IA [35]. The 20-item questionnaire measures characteristics and behaviours associated with compulsive use of the Internet that include compulsivity, escapism, and dependency. Questions also assess problems related to personal, occupational, and social functioning stemming from Internet use. The respondents respond on a scale from 0 (never) to 5 (always): score of 19 and less indicates an absence of addiction, 20 to 39 mild/average addiction, 40 to 69 represents a moderate degree of IA, while scores from 70 to 100 indicate severe IA. Scale is reliable and valid, with high internal reliability Cronbach's alpha 0.93 [36]. This scale was validated in Croatian on a sample of adolescents with internal reliability (Cronbach alpha) of 0.91 [18].

Respondents' interpersonal orientation was measured by The Interpersonal Orientation Scale – IOS It is intended to measure generalized attitudes towards others [31]. The scale consists of two general factors - positive (philanthropic) and negative (misanthropic) orientation against people. Philanthropic orientation includes the Need for people (8 particles) and Friendship (8 particles) as sub factors. Misanthropic orientation includes Mistrust (7 particles) and Social isolation (6 particles) as sub factors [37]. The subjects respond on the five-point Likert type scale ranging from 0 - strongly disagree to 4 - completely agree. The total result is formed as a simple linear combination of marked numbers according to the corresponding subscales. Bezinović states that Cronbach's reliability coefficients are 0.85 for the Need for people subscale, 0.82 for Friendship, 0.81 for Mistrust, and 0.79 for Social isolation [31].

For measuring psychological distress, The General Health Questionnaire – GHQ-30 was used [38]. GHQ is one of the most commonly used instruments for mental stress estimation with aim of distinguishing healthy individuals from ones with self-perceived psychological disorders [39-41]. The questionnaire contains questions about general level of happiness, experience of depressive and anxiety symptoms and sleep disturbance [40,42]. It contains equal number of positive questions indicating health and negative indicating illness [38]. Higher total scores reflect higher levels of psychological distress. The responses range over a 4-point scale, from "less than usual" to "much more than usual". The original binary rating model with four-point response scale 0-0-1-1 (presence of symptom: not at all=0, same as usual=0, more than usual=1, much more than usual=1) was used [43,44].

For every individual points were scored into GHQ-score ranging from 0-30. We applied a GHQ-30 cut-off score of ≥ 5 where all those scoring 0-4 were considered non-distressed and all those scoring 5-30 were considered psychologically distressed. The sensitivity and specific of the GHQ-30 is evaluated to be 80-81% [38]. In addition, each respondent completed a short questionnaire containing sociodemographic questions (gender, age, educational levels) and questions about average time spent online and types of online activities they practiced.

Statistical analysis

Statistical analysis was performed with SPSS version 18.0 software package. Categorical variables were presented as frequencies (%). To determine demographic factors associated with IA levels, contingency tables were generated and then tested with the chi-square or ANOVA tests. Continuous data were presented as means and standard deviations. Between-group comparisons of continuous variables were performed using ANOVA.

An odds ratio with 95% confidence interval (OR [95% CI]) were used to determine the probability of developing IA with respect to time spent on Internet, types of Internet activities as well as psychological features of the participants. Next, the importance of demographic predictors, characteristics of Internet usage and psychological variables were estimated using regression models, where the IAT score was the dependent variable. The significance threshold was set at $p < 0.005$.

Ethics statement

This study was conducted in accordance with the Declaration of Helsinki, was not endorsed by any particular funding nor pre-registered. The survey was completely anonymous; no identifiable personal data or IP addresses were collected. Participants were recruited on a voluntary basis and could withdraw from the survey at any moment without providing any justification. The survey was approved by The Ethics Committee of the University of Split, University Department of Health Studies. All authors certify responsibility for the manuscript. There were no known conflicts of interest.

Results

Most of the respondents in this study reported using Internet 1-3 hours per day (43.9%) while the main activities were instant massaging (79.7%), social networking (77.4%) and news reading (72.9%) (Table 1).

The average IA test score ($M = 25.04 \pm 16.24$) indicated relatively low levels of IA in this sample considering that maximum possi-

Table 1. Time spent online and characteristics of Internet usage

Internet usage characteristics	n (%)
Time spent online	
1 hour per day and less	44 (14.2)
1-3 hour per day	136 (43.9)
3-6 hours per day	89 (28.7)
More than 6 hours per day	41 (13.2)
Internet activities	
Reading news	226 (72.9)
Activities on various websites	146 (47.1)
Social networking	240 (77.4)
Instant massaging	247 (79.7)
Educational/work purpose	192 (61.9)
On-line gaming	39 (12.6)
On-line shopping	108 (34.8)

Table 2. Internet addiction levels across sample

Internet use level	n (%)
Normal usage	204 (65.8)
Mild addiction	80 (25.8)
Moderate addiction	25 (8.1)
Severe addiction	1 (0.3)

ble score is 83. Still, about 35% of the respondents achieved the score above the cut-off value for determining the IA but the majority (25.8%) belonged in the category of mild addiction (Table 2).

The results suggest that levels of the IA are declining with age, meaning that older subjects had lower levels of IA, while younger age presents a risk factor for developing higher degrees of IA ($p < 0.001$). The gender differences in the levels of IA indicate that men are at greater risk for developing IA ($p = 0.05$). The differences in the IA were not established with respect to education levels (Table 3).

The OR was used for exploring the likelihood of developing an IA regarding characteristics of Internet usage and psychological attributes. Results showed some significant association between time spent online and IA. Spending less time online seems to be protective to IA. Internet users who spent 1 hour ($p < 0.001$; OR 0.100 [0.033 - 0.307]) and 1-3 hours per day ($P = 0.001$; OR 0.303 [0.147 - 0.624]) online are at lower risk for developing IA, while users who spent more than 6 hours per day online are at greater risk for developing IA ($p < 0.001$) (Table 4).

Table 3. Differences in the Internet addiction levels with respect to sociodemographic characteristics

	Internet usage				
	Normal usage	Mild addiction	Moderate addiction	Severe addiction	P
Gender †	n (%)	n (%)	n (%)	n (%)	
Male	53 (63.1)	27 (32.1)	3 (3.6)	1 (1.2)	0.050*
Female	151 (66.8)	53 (23.5)	22 (9.7)	0 (0.0)	
Educational level †	n (%)	n (%)	n (%)	n (%)	0.474
Primary education	1 (33.3)	2 (66.7)	0 (0.0)	0 (0.0)	
Secondary education	51 (64.6)	23 (29.1)	5 (6.3)	0 (0.0)	
Higher education	125 (64.4)	49 (25.3)	19 (9.8)	1 (0.5)	
Scientific degree	27 (79.4)	6 (17.6)	1 (2.9)	0 (0.0)	
Age‡	M±SD	M±SD	M±SD	M±SD	
	39.46 ± 11.989	35.38 ± 11.857	34.28 ± 11.731	59.00 constant	0.007**

Legend: *$p < 0.05$; **$p < 0.01$; † $\chi 2$ – test; ‡ F (ANOVA)

Table 4. Odds ratio for Internet usage characteristics in univariate logistic regression models

	P	OR [95% CI]
Time spent on-line		
1 hour per day and less	< 0.001	0.100 [0.033 - 0.307]
1-3 hour per day	0.001	0.303 [0.147 - 0.624]
3-6 hours per day	0.238	0.639 [0.303 - 1.346]
More than 6 hours per day	< 0.001	1.000
Internet activities		
Reading news	0.912	1.034 [0.569 - 1.880]
Activities on various websites	0.647	1.127 [0.675 - 1.883]
Social networking	0.188	1.516 [0.816 - 2.818]
Instant massaging	0.385	1.333 [0.697 - 2.548]
Educational/work purpose	0.192	0.707 [0.420 - 1.190]
On-line gaming	0.490	1.286 [0.630 - 2.625]
On-line shopping	0.525	1.198 [0.686 - 2.091]

OR- odds ratio, CI – confidential intervals, *p < 0.05; **p < 0.01

Results indicates that subjects who are at greatest risk for developing IA are those with higher GHQ score (p = 0.007; OR 1.122 [1.032 - 1.220]), those who are more socially isolated (p = 0.012; OR 1.118 [1.019 - 1.226] and those who are in more need for people (p = 0.05; OR 1.077 [0.998 - 1.161]) (Table 5).

Accordingly, a stepwise regression analysis was used to examine the contribution of the general characteristics, characteristics of Internet activities, general health, and interpersonal orientation in explaining the variance of the IA (Table 6). IAT scores were used as a criterion variable, while time spent online and psychological characteristics of respondents were used as predictor variables. By using the stepwise regression analyses it was found that, out of a total of seven predictor variables, only time spent online, general health, need for people and social isolation were identified as significant predictors. These predictors jointly explain 27% of the variance of the IA (Table 6).

Table 5. Odds ratio for psychological characteristics in univariate logistic regression models

	P	OR [95% CI]
GHQ score	0.007	1.122 [1.032 - 1.220]
Psychological distress	0.315	1.673 [0.613 - 4.585]
In need of people	0.056	1.077 [0.998 - 1.161]
Friendship	0.232	0.953 [0.882 - 1.031]
Untrusting	0.989	1.000 [0.932 - 1.074]
Social isolation	0.018	1.118 [1.019 - 1.226]

OR- odds ratio, CI – confidential intervals, *p < 0.05; **p < 0.01

Table 6. Summary of stepwise regression analysis for internet addiction based on demographic and personality characteristics

IAT score			
	β	t	p
Time spent on the Internet	0.33	6.7	0.000
GHQ score	0.25	4.8	0.000
Need for people (philanthropic interpersonal orientation)	0.17	3.33	0.001
Social isolation (misanthropic interpersonal orientation)	0.16	2.99	0.003
Summary	$R = 0.52$ $R^2 = 0.27$ $F(4,305) = 28.05$ $P < 0.001$		

*p < 0.05; **p < 0.01, β -standardized regression coefficient, F – ANOVA test, t -t test

Discussion

The main purpose of this study was to identify factors contributed to vulnerability for IA and to investigate the frequency of IA and characteristics of Internet usage (time spent online and types of Internet activities) in this (specific) sample of Croatian Internet users. Accordingly, we found that majority of participants in this sample (about 65%) scored below the cut-off value of IAT (< 20) indicating the absence of IA. The remaining 35% of participants, according to their test results, fit into one of the categories of IA, with the largest number falling into the categories of mild (25.8%; 20 ≤ IAT ≤ 39), or moderate (8%; 40 ≤ IAT ≤ 69) addiction. Only one participant fit into the category of severe addiction level. These data indicate a significantly lower expression of IA than those found in a sample of Croatian high school students where even 75.6% of respondents fits into one of the categories on IAT (39% into mild, 32 into moderate and 3.4% into severe addiction category) [18]. Epidemiological data on the incidence of IA vary widely, depending on the methodology used, characteristics of the study populations and the cultural climate in which the research takes place. Recent studies showed the prevalence of IA in the range from 5% to 28% [20,45,46]. In a study investigated younger population, 48.6% of students didn't have IA, while 49.5% reported moderate internet usage and 1.9% reported severe IA [47]. Prevalence of IA within adolescent group varies between 5% and 15,2% in the Europe and 2.5% and 26.8 in the Asian countries [48].

The findings in this study indicate an increased vulnerability of men and younger participants to the development of IA, which is consistent with most previous studies. Research consistently points to the male population, and younger age, as risk factors for the development of the IA [49-53]. Gender and age differences in IA should also be considered in the context of time spent on the Internet and in the context of various types of online activities. Previous studies have found that characteristics of Internet usage including time spent online (more than 10 hours daily), and specific types of Internet activities are also connected with the higher levels of IA [21]. Accordingly, our research showed that most of the participants reported using Internet 1-3 hours per day (43.9%). Odds ratio in this study indicate that spending less time online serve as a protective factor towards the

development of IA where Internet users who spent from 1 to 3 hours per day online are at lower risk for developing IA. Although research to date has found that various types of online activities (such as compulsive shopping, compulsive sexual behaviour or pathological gambling, downloading of music, programs, movies, etc.) don't have same addictive potential, the effect of the type of online activities has not been confirmed in this study [54]. Our participants state that they most often use the Internet for reading news, social networking, messaging and for working/educational purposes, but much less often for online gaming and online shopping, which are considered activities with greater addictive potential [21]. Most respondents in this study report that they rarely or never stay online longer than planned and neglect chores or that their job/academic productivity suffers due to Internet or form relationships online. The great majority of respondents report that they do not use Internet to avoid life problems and deny being annoyed when bothered while being online or losing sleep due to Internet activities.

If we consider time spent online and the preference for certain types of Internet activities in the context of established gender and age differences in vulnerability to IA, it can be understood why male gender and younger age are risk factors for IA development. Previous studies show that men spend more time playing games online, while women spend more time on social networks and e-mails, and the activity of playing games shows a risk towards addictive behaviour [55]. Younger people on average spend a lot more time on the Internet than people in older age groups [56].

In addition to factors related to both characteristics of Internet activities and sociodemographic features, the effect of psychological characteristics is also important for the development of addiction. In this study, we examined the impact of general psychological state and interpersonal orientation on the development of IA. Odds ratio and regression analyses indicate the relationship between general mental state (GHQ score) and IA score. This finding is consistent with findings in prior research indicating that people who have poorer mental health, higher levels of psychological distress and more psychological symptoms, such as anxiety and depression, are more likely to develop an IA [24,57-61]. In this study, it was also found that both styles of interpersonal orientation are associated with IA. It is possible that people with pronounced misanthropic tendencies and social isolation resort to the Internet to reduce their sense of isolation by preferring online activities instead of live contacts (34). Thus, the Internet may provide a substitute for the joyless lives of isolated people, but, on the other hand, they can increase their isolation due to absence of „offline" contacts and the emergence of IA [24]. Next, our study results suggest greater vulnerability to IA in individuals with philanthropic tendencies. It is possible that people with a philanthropic orientation fulfil their pronounced need for social contacts by excessive use of the Internet in order to prolong and expand existing real-world contacts, as suggested by Zywica and James Danowski [33]. If such behaviours involve excessive use of the Internet, they are at risk of developing IA.

In considering the relationship between psychological factors and IA, it is not possible to determine whether psychological problems precede the development of addiction or arise as a result of IA. Causal effects between those variables may not be confirmed based on our findings due to cross-sectional study design.

In this online survey of risk factors for IA, the findings should be interpreted under several limitations. Firstly, the sample in this study was convenient which limits the availability of respondents to volunteers who are frequent internet users or those who are interested in the research topic. Secondly, the female predominance of this sample may affect result interpretations and limit its generalization to female online users. Thirdly, there were more middle-aged participants rather than youth participants in this survey, limiting the comparability between ours and other studies which are mostly limited to younger population.

However, this can also be the advantage of this study due to its unique age constitution. Our findings may fill the gap beyond prior findings focusing on IA in young people. Next limitation refers to impossibility of establishing causal effects between the independent variables and IA due to cross-sectional study design. A longitudinal study design that is recommended for future studies would be more appropriate to unravel the possible causal direction of the association between IA and psychological factors. That is, the link between IA and psychological distress as observed in this study is simply associational and hence we could not rule out the possibility that psychological distress causes IA rather than the other way round. Finally, this research was conducted immediately before the onset of coronavirus crisis and the introduction of epidemiological protective measures of social distance and online working. Therefore, we cannot ignore the possibility that the results of this study would look significantly different today. In short, in order to reduce the sources of bias, future research should use a representative sample of participants and follow up research design taking into account the possible effects of a pandemic on the rise of Internet addiction.

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Conflict of interest

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Rizični čimbenici za ovisnost o internetu među korisnicima interneta u Hrvatskoj: mrežno ispitivanje

Sažetak - Cilj ovog istraživanja bio je ispitati razinu ovisnosti o internetu te značajke korištenja interneta među hrvatskim korisnicima. Cilj je bio istražiti vjerojatnost razvoja ovisnosti o internetu u pogledu osobnih karakteristika i karakteristika korištenja interneta te uz to ispitati mogućnost predviđanja razine ovisnosti o internetu na temelju psiholoških karakteristika. Oko 35% ispitanika postiglo je rezultat iznad granične vrijednosti za određivanje ovisnosti o internetu, ali većina je svrstana u kategoriju blage ovisnosti. Rezultati su pokazali kako mlađa dob ($F = 4,14$, $p = 0,007$) i muški spol ($\chi 2 = 7,49$, $p = 0,05$) mogu poslužiti kao čimbenici rizika za razvoj ovisnosti o internetu. Također je utvrđeno da provođenje više od 3 sata dnevno na internetu ($\beta = 0,33$, $p < 0,001$), zajedno s lošijim općim zdravljem ($\beta = 0,25$, $p < 0,001$) i neučinkovitim međuljudskim stilovima (mizantropni $\beta = 0,17$, $p < 0,01$ naspram filantropskog $\beta = 0,16$, $p < 0,01$), značajno doprinosi razvoju ovisnosti o internetu.

Ključne riječi: Ovisnost o internetu; korisnici interneta; psihološke značajke; Hrvatska