



The role of depression, personality, and future time perspective in internet addiction in adolescents and emerging adults

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ABSTRACT

With the increase in the popularity of the Internet, more and more of its users are becoming addicted to it. Special focus in this study is placed on adolescents and emerging adults who constitute the largest number of users in Poland. The participants in the study were 718 individuals aged 12 to 30 ($M = 17.57$, $SD = 3.63$). There were two groups: 390 adolescents (aged 12–17 years, $M = 14.71$ years, $SD = 0.99$; 192 females) and 328 emerging adults (aged 18–30 years, $M = 20.96$ years, $SD = 2.54$; 197 females). The respondents completed: the Polish versions of Young's Internet Addiction Test (IAT), the Center for Epidemiologic Studies Depression Scale (CES-D), the IPIP-BFM-20 questionnaire measuring the Big Five, and the Future Time Perspective Questionnaire. The results showed that depression had the highest predictive power for IA. Personality traits were related to Internet addiction. In both groups, conscientiousness and agreeableness had negative contribution to Internet addiction. In the group of adolescents extraversion was a positive predictor of IA, whereas in emerging adults intellect was a negative predictor of IA. FTP long and FTP goals were predictors of IA in the group of emerging adults.

1. Introduction

For many years the Internet has been an indispensable part of functioning, both private and professional; especially young people – adolescents and emerging adults – use it as a tool for communication, as a way of acquiring information, or as a form of entertainment (Aslanidou and Meneses, 2008; Wallace, 2014). On the one hand, the Internet makes life easier; on the other, it has become a source of problems. Excessive Internet use has become a cause of addiction, which leads to considerable disturbances in all areas of human functioning (Akin, 2012; Anderson, 2001). In the literature it is possible to find the following terms related to this phenomenon: pathological Internet use, Internet abuse, compulsive Internet use, impulse control disorder, excessive Internet use, and dysfunctional Internet use (Blachnio et al., 2015; Yellowlees and Marks, 2007). What is highlighted as the core of this concept is the loss of control over Internet use and the excessive amount of time spent in front of the computer screen, resulting in a negative influence of Internet use on the physical, mental, interpersonal, and social spheres (Blachnio et al., 2015; Young, 1998).

This study was intended to explore Internet addiction among Polish adolescents and emerging adults, who constitute the largest group of Internet users (Internet World Statistics, 2017). Considering their frequent Internet use and lower ability to control it, this group is more

vulnerable than others to develop dysfunctional Internet use (Shaw and Black, 2008). Reflecting this trend, studies on Polish respondents aged 14–17 show that more than 13% of them use the Internet in dysfunctional ways and that 1.3% of Polish young people display symptoms of Internet addiction. What is more, 12.0% of young Poles are at risk of Internet abuse (Makaruk and Wójcik, 2012). In a different study conducted in Poland with a sample of 805 children aged 11–16 (Kirwil, 2011), 9% of the subjects showed all of the listed symptoms of addiction, namely: eating and sleeping problems, unsuccessful attempts at controlling the amount of time spent online, a sense of deficiency when using the Internet was impossible, lack of time for family and friends, neglect of duties, and aimlessly surfing the Internet. Individual symptoms were reported by 18%–38%, more often by boys than by girls.

Numerous studies stress the comorbidity of Internet addiction with serious mental health problems, among which depression is one of the most common (Carli et al., 2013). There are several symptoms of depression, such as insomnia or hypersomnia, diminished ability to think or concentrate, or recurrent thoughts of death (American Psychiatric Association, 2013). Those who suffered from depression, had low self-esteem, or felt a high need for acceptance were more vulnerable to Internet addiction (Young and Rogers, 1998). There have been some empirical attempts to investigate the scale of Internet addiction and

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depression among adolescents; researchers have pointed out the difficulties in determining the direction of this relationship (Ko et al., 2009; Lam and Peng, 2010; Liang et al., 2016; van den Eijnden et al., 2008; Wastlund et al., 2001).

Based on the existing studies on predisposition to Internet addiction, it is possible to name a certain characteristics of this kind. There are a number of studies in the literature that show personality variables which may predispose a person to problematic Internet use. Researchers have found Internet addiction to be related to high loneliness (social isolation), fascination with computer technology and the possibilities offered by the Internet, as well as introversion (Beard and Wolf, 2001; Koch and Pratarelli, 2004), low emotional openness (Leung, 2004), high loneliness (Morahan-Martin and Schumacher, 2000), low agreeableness and conscientiousness (Landers and Lounsbury, 2006), high other-directedness (Hamburger and Ben-Artzi, 2000), low openness to experience, and low positive orientation (Blachnio and Przepiorka, 2016). A cross-cultural study revealed that lower emotional stability, extraversion, and conscientiousness were significant predictors of Internet addiction regardless of the cultural factor (Blachnio et al., 2015).

Based on an analysis of Internet addiction articles reporting qualitative studies on Internet addiction published from 1996 to 2006 (Douglas et al., 2008), a conceptual model of the Internet addiction phenomenon was introduced, including individual's predisposition, inner needs and motivations ("push factors"), attractive features of the medium ("pull factors"), as well as deviant behaviors and control strategies as moderators between push factors and negative effects of Internet overuse. As regards the antecedent constructs, it was loneliness, low self-confidence, and self-esteem that predisposed individuals the most strongly to Internet addiction. Another systematic review of longitudinal research on problematic Internet use in adolescents and emergent adults (Anderson et al., 2017) placed a special focus on individual, contextual, and Internet activity-related factors. The authors concluded that the majority of the reviewed studies focused on Internet users' individual characteristics. They identified personal attributes related to problematic Internet behaviors; among them, high extroversion and neuroticism, low self-control, and high impulsivity were the most predictive.

Looking for other factors that could help explain Internet addiction, we decided to examine time perspective theory, considering its robust predictive power for human functioning (for a review, see Nuttin, 1964). Time perspective is defined as a multidimensional construct, associated with the ability to anticipate future events and to distance oneself from the past (Cottle, 1976; Nuttin, 1985). Frank (1939) understood future time perspective as a motivating orientation to achieve future goals. Ideas concerning the future play an important role in the regulation of individuals' activity (Nuttin, 1985). The longer the positive future time perspective, the higher the positive value attributed to goals and, consequently, the higher the motivation to plan and act, accompanied by higher resistance to obstacles (Zaleski, 1987). Future time perspective means behavior dominated by the pursuit of goals located in the future (Zimbardo and Boyd, 1999). This future orientation makes it possible to predict and consider the consequences of one's behavior, which manifests itself in greater responsibility for one's actions.

So far, time perspective theory has been applied in many studies in reference to addictive behaviors. It played a significant role in explaining addiction to alcohol, drugs, and tobacco (Apostolidis et al., 2006; Beenstock et al., 2011; Hall et al., 2012), gambling (e.g., Hodgins and Engel, 2002; Sharif-Razi et al., 2012), or cannabis consumption (Apostolidis et al., 2006). What is more, previous studies show a relationship of time perspective with addiction to the Internet and social networking sites (Chittaro and Vianello, 2013; Lukavska, 2012; Przepiorka and Blachnio, 2016).

1.1. Hypotheses

Considering the lack of studies in which the main emphasis in explaining Internet addiction would be placed on the length of future time perspective and long-term goals as components of future time perspective, the present study was supposed to fill this gap. We chose to examine young people, who are the largest group of Internet users. The main aim of the present study was to investigate the links between personality, future time perspective, depression, and Internet addiction. The study was meant to verify whether depression, personality, and future time perspective could promote the development of online addiction. We hypothesized that these psychological characteristics would be predictors of Internet addiction. We assumed that those who were depressed would be more inclined to develop Internet addiction (H1), as in previous studies (e.g., Blachnio et al., 2015). We hypothesized that personality traits would be related to Internet addiction, with conscientiousness as the trait most predictive of IA (H2). As regards future time perspective, we expected that those who had less long-term goals and viewed their future in a shorter perspective would be more at risk of developing online addiction (H3).

2. Method

2.1. Participants and procedure

The sample consisted of 718 individuals ranging in age from 12 to 30 years ($M = 17.57$, $SD = 3.63$); 389 of the participants were women. Based on age, we distinguished two subgroups: 390 adolescents (aged 12–17 years, $M = 14.71$ years, $SD = 0.99$; 192 females) and 328 emerging adults (aged 18–30 years, $M = 20.96$ years, $SD = 2.54$; 197 females). The participants had been recruited in different types of educational institutions: middle, and secondary schools as well as universities from three voivodships (administrative regions) of Poland (Mazowieckie, Lubelskie, and Pomorskie). Those who participated in the study declared that they were not married and had no children. They were still in the process of receiving formal education. They were approached in their classes and asked to complete the questionnaires. They volunteered for the study and received no monetary reward. All participants reported that they used the Internet. They were informed about the purpose of the study and assured that their participation was anonymous.

2.2. Measures

The participants completed three questionnaires: the Internet Addiction Test (IAT), the Center for Epidemiologic Studies Depression Scale (CES-D), the IPIP-BFM-20 questionnaire measuring the Big Five, and the Future Time Perspective Questionnaire. Additionally, the respondents were asked about their gender and age, about the time devoted to Internet use during the week and during weekends, and about their grade point average (GPA) from the previous year. We used the Polish versions all of the scales.

Young's Internet Addiction Test (Young, 1998) comprises 20 items (e.g., *How often do you become defensive or secretive when anyone asks you what you do on-line?*; *How often do you block out disturbing thoughts about your life with soothing thoughts of the Internet?*); it was adapted into Polish by Hawi, Blachnio, and Przepiorka (2015). Cronbach's α was 0.92 (range points). The IAT is a valid cosmopolitan one-factor instrument for measuring Internet addiction. Each item is rated on a Likert scale from 0 – *not applicable* to 5 – *always*. The maximum score is 100 points, indicating severe dependence on the Internet.

The Center for Epidemiologic Studies Depression Scale (CES-D; Radloff, 1977; Eaton et al., 2004) consists of 20 items measuring the level of depression (e.g., *I had trouble keeping my mind on what I was doing*; *I had a crying spell*). CES-D scores range from 0 (no depressive symptoms) to 60 (maximum depressiveness). The participants are asked

how often they have felt in the ways described during the past week. They indicate their responses on a 4-point scale: rarely or none of the time (less than 1 day), some or a little of the time (1–2 days), occasionally or a moderate amount of time (3–4 days), most or all of the time (5–7 days). In the present study, Cronbach's α was 0.85.

The IPIP-BFM-20 questionnaire measuring the Big Five. The questionnaire measures five traits (extraversion, agreeableness, conscientiousness, emotional stability, intellect) and consists of 20 items. It is a shortened version of the 50-item Big Five Markers questionnaire from the resources of Goldberg's International Personality Item Pool, whose Polish version was prepared by Topolewska et al. (2014). The reliability of its scales (Cronbach's alpha) ranged from 0.75 to 0.88. For each subscale, the minimum score is 1 and the maximum score is 20. Higher scores indicate higher levels of a given trait.

To measure future time perspective, we used the Future Time Perspective Questionnaire by Lens adapted into Polish by Cycoń and Zaleski (1998). It contains 30 items rated on a 7-point Likert scale and provides an overall evaluation of the respondent's structure of future time perspective (e.g., “I have a few goals to achieve in the future.”). For the purpose of the study we used two subscales out of three: (1) *planning for future* (FTP long) that includes optimism and a sense of self-determination, planning and preparation for the future, the ability to delay gratification and (2) *realization of future projects* (FTP goals) that refers to the implementation of projects in the future, analyzing alternative strategies in achieving goals, thinking in terms of action. The psychometric properties of the scale are good. The reliability of its subscales (Cronbach's alpha) ranged from 0.77 to 0.86. For both subscales, the minimum score is 1 and the maximum score is 70. Higher scores indicate higher tendency to plan for the future and higher realization of future projects, respectively.

3. Results

The descriptive statistics such as means and standard deviations for all the variables as well as Pearson's r correlations between the variables are presented in Table 1. Internet addiction correlated positively with depression and with weekday and weekend Internet use, and negatively with FTP goals, long FTP, and GPA. As regards personality traits, IA correlated negatively with extraversion, conscientiousness, agreeableness, emotional stability, and intellect (see Table 1).

In order to assess the differences between the two groups: adolescents and emerging adults, we performed independent samples t -tests and compared mean differences. Where variances between the groups were heterogeneous, we performed Cochran–Cox adjustment (Cochran and Cox, 1957). The magnitude of differences was measured as Cohen's d effect size and interpreted in accordance with Cohen's

(1988) guidelines: small $d = 0.2$, moderate $d = 0.5$, and large $d = 0.8$. There was a difference between adolescents and emerging adults in Internet addiction, weekend Internet use, GPA, long FTP, and FTP goals (see Table 2).

In order to analyze the relations between personality traits, future time perspective, depression, Internet use time (on weekdays and on weekends, in hours), GPA, and Internet addiction in adolescents and emerging adults, we examined the structural model using the maximum likelihood method (Byrne, 2010; Kline, 2011). Taking previous research into account (Błachnio et al., 2017; Kim et al., 2017; King, 2016; Salmela-Aro et al., 2017; Przepiorka and Błachnio, 2016) we developed a model with personality traits, depression, and future time perspective as predictors of Internet addiction, and with Internet addiction, Internet use time (in hours), future time perspective, and personality traits as predictors of GPA. In addition, we investigated the relationship between depression, FTP, and time spent using the Internet (see Błachnio et al., 2015; Przepiorka and Błachnio, 2016). The following statistics were computed as measures of model fit: χ^2 , χ^2/df , RMSEA, SRMR, GFI, CFI, NFI, and TLI (Byrne, 2010; Kline, 2011). The value of χ^2/df ratio lower than 2 may suggest a good fit to the dataset (Kline, 2011). Statistically non-significant ($p > .05$) chi-square values suggest that the proposed model fits the dataset well. RMSEA values lower than 0.05 and SRMR values lower than 0.08 indicate a good fit of the model (Kline, 2011). GFI, CFI, NFI, and TLI values higher than 0.95 allow the conclusion that the model fits the dataset well (Byrne, 2010). We also used the bootstrapping method (5000 samples) with the bias-corrected percentile method to estimate standardized regression weights, correlations, R -squared values, and indirect effects with 95% confidence intervals (CIs). Additionally, considering that the time spent using the Internet can be treated either as a predictor or as an effect of addiction (see Brand et al., 2014, 2016), we compared two models. In the first one, time spent using the Internet was included as a predictor of Internet addiction (Model 1), and in the other model Internet use time was treated as a consequence of this type of addiction (Model 2). In addition, in the analyses we distinguished the groups of adolescents (see Fig. 1) and emerging adults (see Fig. 2). The model also included the covariance between personality traits, depression, and future time perspective. However, due to the clarity of the model they are not shown in Figs. 1 and 2, so their values can be found in the supplementary materials.

The analyses carried out indicate that Model 1 did not fully fit the dataset: $\chi^2_{(df = 32)} = 56.28$, $p = .005$, $\chi^2/df = 1.76$, RMSEA = 0.033, SRMR = 0.051, GFI = 0.987, CFI = 0.990, NFI = 0.978, TLI = 0.959. Model 2, by contrast, was fully fitted: $\chi^2_{(df = 32)} = 35.39$, $p = .311$, $\chi^2/df = 1.11$, RMSEA = 0.012, SRMR = 0.027, GFI = 0.992, CFI = 0.999, NFI = 0.986, TLI = 0.994. We therefore used the Akaike information

Table 1

Means, standard deviations, and correlations between variables for all participants (N = 718).

Variables	<i>M</i>	<i>SD</i>	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1] Internet addiction	1.27	0.88											
[2] Internet hours - weekday	4.82	4.51	.23***										
[3] Internet hours - weekend	6.64	6.54	.21***	.79***									
[4] GPA	4.13	0.73	−0.10**	−0.15***	−0.06								
[5] Depression	1.96	0.53	.45***	.14***	.12**	−0.04							
FTP													
[6] Long	3.88	0.87	−0.17***	−0.09*	−0.09*	.13***	−0.17***						
[7] Goals	4.02	0.81	−0.13**	−0.10**	−0.11**	.16***	−0.11**	.76***					
Personality													
[8] Extraversion	3.36	0.95	−0.09*	.02	.04	−0.05	−0.25***	.16***	.11**				
[9] Agreeableness	3.71	0.81	−0.20***	−0.09*	−0.11**	.10*	−0.12*	.22***	.27***	.27***			
[10] Conscientiousness	3.12	0.88	−0.32***	−0.12**	−0.12**	.11**	−0.15***	.18***	.18***	.02	.18***		
[11] Emotional stability	3.00	0.94	−0.27***	−0.09*	−0.07*	−0.01	−0.57***	.11**	.08*	.29***	.03	.09*	
[12] Intellect	3.66	0.80	−0.23***	−0.04	−0.07	.13**	−0.21***	.30***	.29***	.24***	.25***	.09*	.23***

FTP: Future Time Perspective; GPA: Grade Point Average.

* $p < .05$.

** $p < .01$.

*** $p < .001$.

Table 2
Differences between adolescents and emerging adults.

Variables		Adolescents (N = 390)		Emerging adults (N = 328)		t	p	Cohen's d
		M	SD	M	SD			
Internet addiction		1.37	0.94	1.16	0.79	3.28	.001	0.24
Internet hours - weekday		5.10	4.97	4.48	3.87	1.89	.061	–
Internet hours - weekend		7.54	7.16	5.57	5.53	4.15	.001	0.31
GPA		4.28	0.81	3.95	0.58	6.40	.001	0.47
Depression		1.99	0.57	1.93	0.49	1.73	.084	–
FTP	Long	3.80	0.94	3.97	0.78	–2.55	.011	0.20
	Goals	3.96	0.85	4.09	0.76	–2.17	.030	0.16
Personality	Extraversion	3.36	0.93	3.35	0.97	0.17	.867	–
	Agreeableness	3.71	0.82	3.71	0.80	–0.10	.921	–
	Conscientiousness	3.07	0.87	3.19	0.89	–1.91	.057	–
	Emotional stability	3.04	0.95	2.94	0.92	1.50	.134	–
	Intellect	3.62	0.77	3.71	0.82	–1.37	.172	–

FTP: Future Time Perspective; GPAP: Grade Point Average.

criterion (AIC; Akaike, 1987) and the Browne–Cudeck criterion (BCC; Browne and Cudeck, 1989) to compare both models. The values of AIC and BCC were lower for Model 2 (AIC = 283.39, BCC = 292.81) than for Model 1 (AIC = 304.28, BCC = 313.71). Given that models with lower AIC and BCC are considered to be more informative, our results can be interpreted as showing that Model 2 was better than Model 1. Therefore, the model presupposing that Internet use time is a consequence of Internet addiction is presented separately for adolescents (see Fig. 1) and for emerging adults (see Fig. 2).

In the adolescents group, depression ($\beta = 0.36$, $p < .001$, 95% CI [0.24, 0.47]) and extraversion ($\beta = 0.10$, $p = .025$, 95% CI [0.01, 0.20]) were positively and significantly related to Internet addiction. There was also a negative relationship between agreeableness ($\beta = -0.11$, $p = .024$, 95% CI [–0.20, –0.01]) as well as conscientiousness ($\beta = -0.23$, $p < .001$, 95% CI [–0.30, –0.15]) and this type of addiction. Our findings showed that Internet addiction was a predictor of weekday ($\beta = 0.29$, $p < .001$, 95% CI [0.19, 0.37]) and weekend ($\beta = 0.25$, $p < .001$, 95% CI [0.15, 0.35]) Internet use. Intellect ($\beta = 0.12$, $p = .043$, 95% CI [0.01, 0.23]) and Internet use time ($\beta = -0.23$, $p < .001$, 95% CI [–0.35, –0.09]) were predictors of GPA. In addition, there was a positive correlation between the residuals of weekday and weekend Internet use ($r = 0.75$, $p < .001$, 95% CI [0.56, 0.87]). Detailed results are shown in Fig. 1.

CI [0.56, 0.87]). Detailed results are shown in Fig. 1.

In the emerging adults group, depression ($\beta = 0.38$, $p < .001$, 95% CI [0.23, 0.50]) and FTP goals ($\beta = 0.38$, $p < .001$, 95% CI [0.25, 0.51]) were positively and significantly related to Internet addiction. Our study also revealed negative relations between long FTP ($\beta = -0.34$, $p < .001$, 95% CI [–0.48, –0.20]), agreeableness ($\beta = -0.17$, $p = .001$, 95% CI [–0.27, –0.07]), intellect ($\beta = -0.14$, $p = .017$, 95% CI [–0.25, –0.03]), and conscientiousness ($\beta = -0.24$, $p = .001$, 95% CI [–0.33, –0.13]) and this type of addiction. FTP goals ($\beta = 0.24$, $p = .021$, 95% CI [0.04, 0.44]), conscientiousness ($\beta = 0.14$, $p = .017$, 95% CI [0.03, 0.25]), and emotional stability ($\beta = -0.20$, $p < .001$, 95% CI [–0.32, –0.03]) were related to GPA. Furthermore, Internet addiction was a predictor of Internet use time on weekdays ($\beta = 0.12$, $p = .009$, 95% CI [0.03, 0.22]) and on weekends ($\beta = 0.11$, $p = .014$, 95% CI [0.02, 0.21]). There was also a positive correlation between the residuals of weekday and weekend Internet use time ($r = 0.83$, $p < .001$, 95% CI [0.70, 0.91]). Detailed results are shown in Fig. 2.

To examine the potential differences in regression weights between the groups, we performed pairwise parameter comparisons between adolescents ($N = 390$) and emerging adults ($N = 328$). The critical ratios for differences between parameters between the groups with a z -

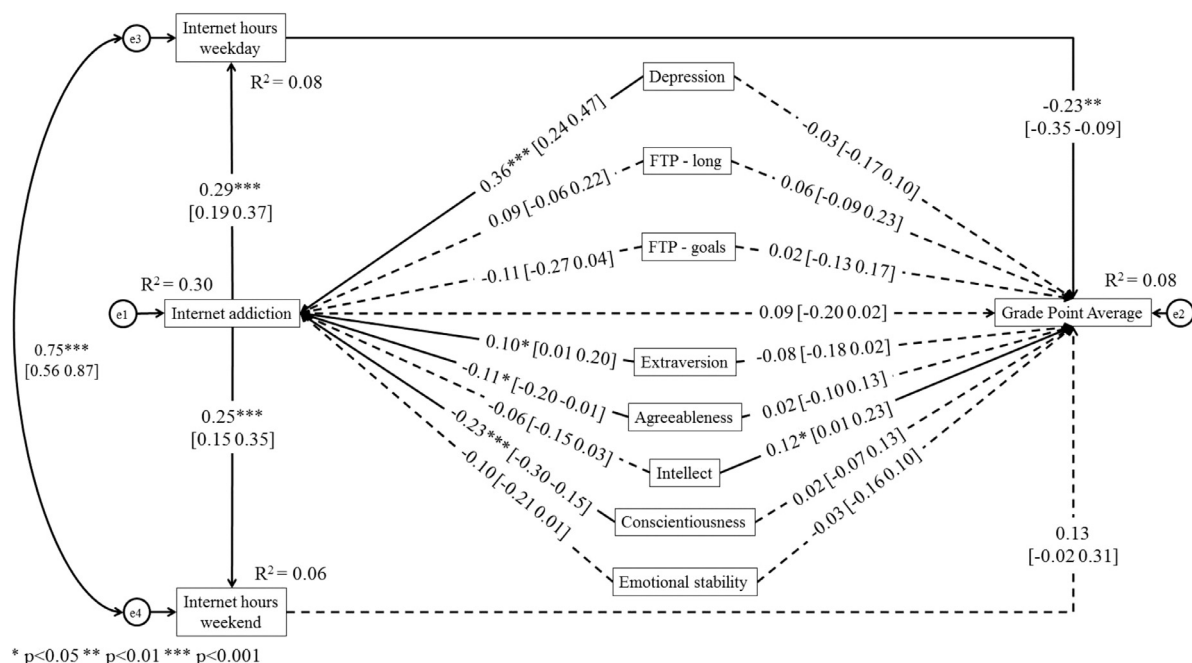


Fig. 1. Structural model of relations between the analyzed variables in the adolescents group.

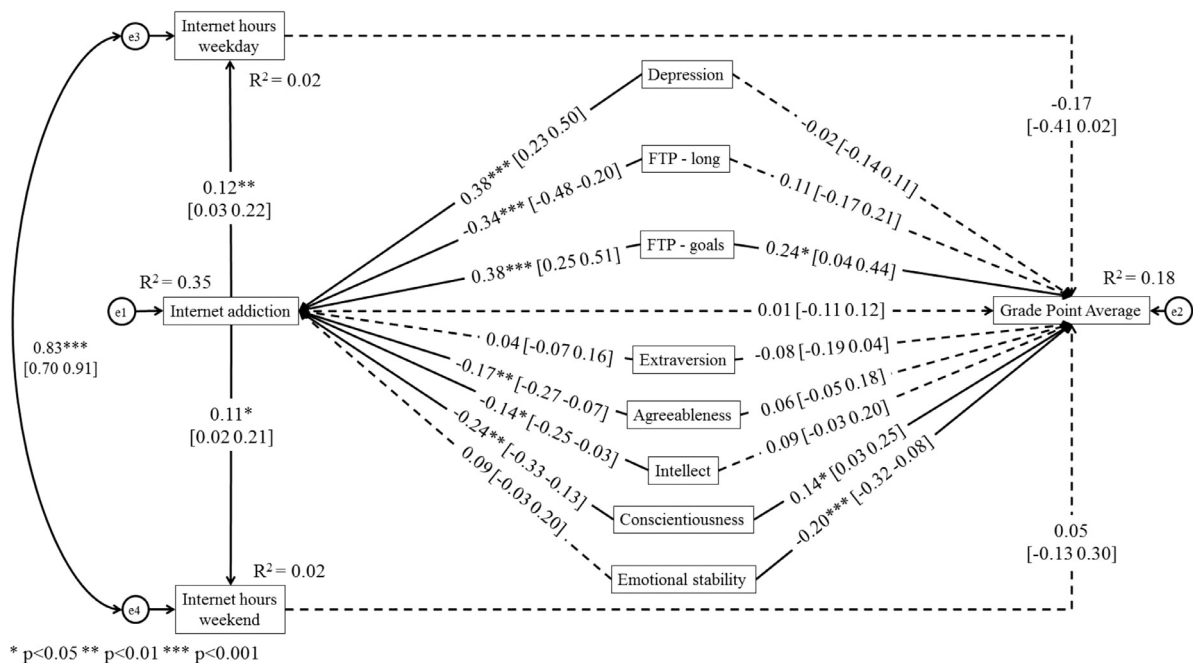


Fig. 2. Structural model of relations between the analyzed variables in the emerging adults group.

score ≥ 1.96 were considered to be significantly different (Byrne, 2010; Hu and Bentler, 1999; Kline, 2011). The pairwise parameter comparisons showed differences in regression weights between adolescents and emerging adults in the case of the relationship between Internet addiction and time spent using the Internet on weekdays ($z = -2.54$, $p = .011$). The standardized regression weight was higher for adolescents ($\beta = 0.29$, $p < .001$, 95% CI [0.19, 0.37]) than for emerging adults ($\beta = 0.12$, $p = .009$, 95% CI [0.03, 0.22]). In the case of the relationship between Internet addiction and time spent using the Internet on weekends, we also found significant differences between the analyzed groups ($z = -2.14$, $p = .032$). The standardized regression weight was higher for adolescents ($\beta = 0.25$, $p < .001$, 95% CI [0.15, 0.35]) than for emerging adults ($\beta = 0.11$, $p = .014$, 95% CI [0.02, 0.21]). There was also a difference between the analyzed groups in the relationship between long FTP and Internet addiction ($z = -4.33$, $p < .001$). The path was significant for emerging adults ($\beta = -0.34$, $p < .001$, 95% CI [-0.48, -0.20]) but not significant for adolescents ($\beta = 0.09$, $p = .232$, 95% CI [-0.06, 0.22]). In the case of the relationship between Internet addiction and FTP goals, significant differences were also found between the analyzed groups ($z = 4.89$, $p < .001$). The path was significant for emerging adults ($\beta = 0.38$, $p < .001$, 95% CI [0.25, 0.51]) but not significant for adolescents ($\beta = -0.11$, $p = .157$, 95% CI [-0.27, 0.04]).

In order to analyze the indirect effect of Internet addiction on GPA mediated by time spent using the Internet on weekdays and on weekends, we used the bootstrapping method (5000 samples) with the bias-corrected percentile method to estimate indirect effects with 95% confidence interval (Bollen and Stine, 1990; Shrout and Bolger, 2002). Based on the bootstrapping procedures, we found significant mediation effects of Internet use. Empirical 95% confidence intervals did not have zero, indicating that the standardized indirect effect was statistically significant. Thus, in both groups, Internet addiction exerted a significant indirect effect on GPA via Internet use time on weekdays. There was also a non-significant indirect effect between Internet addiction and GPA via Internet use time on weekends (see Table 3). It should be noted that the significant indirect effects were probably inconsistent mediations (see MacKinnon et al., 2007). Thus, in this case, the mediator—weekday Internet use—acted as a suppressor variable.

We performed latent profile analysis (LPA; Goodman, 1974;

Table 3				
Bootstrapping standardized indirect effects with 95% confidence intervals.				
Adolescents				
Model pathways	Point estimates	95% CI		p
		Lower	Upper	
Internet addiction – weekday Internet use – GPA	−0.07	−0.12	−0.03	.002
Internet addiction – weekend Internet use – GPA	0.03	−0.01	0.09	.080
Emerging adults				
Model pathways	Point estimates	95% CI		p
		Lower	Upper	
Internet addiction – weekday Internet use – GPA	−0.02	−0.06	−0.01	.047
Internet addiction – weekend Internet use – GPA	0.01	−0.02	0.04	.520

Lazarsfeld and Henry, 1968; Lanza and Rhoades, 2013) in the present study to identify latent profiles of individuals based on personality traits, future time perspective, depression, Internet use time (on weekdays and on weekends, in hours), GPA, Internet addiction, and group (adolescents, emerging adults). Like latent class analysis, latent profile analysis is a type of latent variable model (Goodman, 1974; Lazarsfeld and Henry, 1968). LPA presupposes that there is an elementary unobserved categorical variable that splits a population into mutually exclusive and exhaustive latent classes/profiles. It should be noted that individuals' profile is unknown but can be deduced from a series of continuous observed variables (Goodman, 1974; Lazarsfeld and Henry, 1968; Lanza and Rhoades, 2013). We used the Akaike information criterion (AIC; Akaike, 1974) and Schwarz's Bayesian information criterion (BIC; Schwarz, 1978) for model selection decisions, with lower BIC and AIC values indicating the preferred model. The analyses revealed that the 5-Class model was the best fitting model (see Table 4; the chosen model was bold).

In order to better describe the profiles, we performed an analysis of variance, as in previous studies (Choi et al., 2017; Deleuze et al., 2015; Lindenberg et al., 2018). We performed one-way Type II ANOVA (Langsrud, 2003) for each variable and used T3 Dunnett post hoc test to compare the observed variables across classes, because variances for some of the variables were heterogeneous. Class 5 was included in the analyses despite the very small number of individuals in it. However,

Table 4
Results of latent profile analyses.

Solution	AIC	BIC	Individuals per class					
			Class 1	Class 2	Class 3	Class 4	Class 5	Class 6
1-Class	27,386.29	27,505.28	718					
2-Class	26,679.83	26,862.88	541	177				
3-Class	26,161.36	26,408.49	524	187	7			
4-Class	25,900.39	26,211.59	427	151	136	4		
5-Class	25,504.68	25,879.95	234	354	77	49	4	
6-Class	25,600.5	26,039.84	187	274	108	104	35	10

Table 5
Differences between latent profiles in the observed variables.

Variables	Total		1-Class		2-Class		3-Class		4-Class		5-Class		Variance analysis		Significant differences between the	
	M	SE	M	SE	M	SE	M	SE	M	SE	M	SE	F	p <	η_p^2	classes
Internet addiction	1.27	0.03	0.95	0.06	1.31	0.05	1.75	0.10	1.74	0.14	1.95	0.42	21.35	.001	.11	1–2 1–3 1–4 2–3
Internet hours - weekday	4.82	0.17	3.46	0.18	3.80	0.16	11.99	0.35	4.66	0.41	40.50	1.29	369.70	.001	.67	1–3 1–4 1–5 2–3 2–5 3–4 3–5 4–5
Internet hours - weekend	6.64	0.24	4.90	0.26	4.91	0.22	17.70	0.54	6.30	0.59	56.25	1.85	387.00	.001	.68	1–3 1–5 2–3 2–5 3–4 3–5 4–5
GPA	4.13	0.03	4.32	0.05	4.08	0.04	3.89	0.09	3.95	0.11	4.09	0.36	7.32	.001	.04	1–2 1–3
Depression	1.96	0.02	1.78	0.04	1.98	0.03	2.19	0.06	2.32	0.09	2.13	0.25	19.07	.001	.10	1–2 1–3 1–4 2–4
Personality	3.36	0.04	3.59	0.07	3.27	0.06	3.42	0.11	2.88	0.14	2.81	0.46	7.96	.001	.04	1–2 1–4 3–4
Extraversion	3.71	0.03	4.05	0.06	3.64	0.05	3.41	0.09	3.07	0.12	3.69	0.38	27.77	.001	.13	1–2 1–3 1–4 2–4
Agreeableness	3.12	0.03	3.44	0.06	3.05	0.05	2.71	0.10	2.78	0.13	3.00	0.42	15.54	.001	.08	1–2 1–3 1–4 2–3
Conscientiousness	3.00	0.03	3.28	0.07	2.89	0.06	2.78	0.11	2.78	0.14	2.13	0.46	8.70	.001	.05	1–2 1–3 1–4
Emotional stability	3.66	0.03	4.05	0.06	3.55	0.05	3.47	0.09	2.93	0.11	3.50	0.36	37.90	.001	.18	1–2 1–3 1–4 2–4 3–4
Intellect	3.88	0.03	4.66	0.06	3.64	0.05	3.65	0.07	2.28	0.12	3.78	0.29	282.25	.001	.61	1–2 1–3 1–4 2–4 3–4 4–5
Long FTP	4.02	0.03	4.72	0.05	3.82	0.04	3.80	0.07	2.55	0.11	3.60	0.27	243.83	.001	.58	1–2 1–3 1–4 2–4 3–4
FTP goals	0.46	0.02	0.50	0.04	0.49	0.03	0.28	0.06	0.27	0.07	0.50	0.25	6.07	.001	.03	1–3 1–4 2–3 2–4
Group*																

FTP: Future Time Perspective; GPA: Grade Point Average.

* Group: 0 – adolescents; 1 – emerging adults.

the results associated with this class should be approached with great caution. We found differences between the classes identified on the basis of latent profiles for each of the variables (see Table 5). These findings may indicate that the latent profiles characterize behavior related to Internet use. More specifically, the first group of individuals (Class 1) can be described as a low-risk Internet addiction group because, among other things, they reported the lowest level of Internet addiction, the lowest average Internet use time (in hours) on weekdays and weekends, the lowest depression, the highest conscientiousness, and the highest emotional stability. The second group (Class 2) can be designated as a medium-risk Internet addiction group, because the individuals in this group had moderate scores in the Internet Addiction Test, reported a low average Internet use time on weekdays and weekends as well as moderate depression, conscientiousness, and emotional stability. The third (Class 3) and fourth (Class 4) groups can be described as high-risk Internet addiction groups, because the individuals in these groups had a high level of Internet addiction, low conscientiousness, and high depression. However, despite a similarly high level of Internet addiction, these two groups differed from each other in terms of extraversion, intellect, long FTP, FTP goals, and Internet use time on weekdays and weekends. This may indicate the existence of two profiles of people who are at risk of Internet addiction. In the case of the fifth group (Class 5), it can be very cautiously suggested that he subjects identified as representing it are individuals at a very high risk of Internet addiction, because they had the highest level of this type of addiction as well as the highest average Internet use time on weekdays and weekends, moderate depression, and the lowest emotional stability. However, in the case of this group, this conclusion should be approached very cautiously. It should be noted, too, that in the high-risk Internet addiction groups (Class 3 and Class 4) the ration of adolescents to emerging adults was higher than in the low-risk (Class 1) and medium-risk (Class 2) Internet addiction groups.

4. Discussion

The present study replicated and extended the existing results on possible predictors of IA by including depression, personality traits, and future time perspective. Moreover, the study covered two age groups known to be the most prevalent Internet users: adolescents and emerging adults. This enabled us to compare the patterns of IA predictors in the two age groups and to identify the similarities as well as differences between these groups. Considering that young age may predispose individuals to mental disorders (cf. Patel et al., 2007), it is important to address the problem of depression and Internet addiction in young people.

In both age groups H1 was confirmed, with depression being a significant positive predictor of IA. As in previous studies, we found that the Internet could be a tool to alleviate depression and to reduce its users' stress (Blachnio et al., 2015; Tsai and Lin, 2003). Those who suffer from depression might cope with negative mood through excessive Internet use (Yen et al., 2011). As there is no consensus about the causal relationship these two disorders, in treatment and diagnosis it is essential to bear in mind that they can be mutually aggravating (Ko et al., 2010). We also found that both Internet addiction and depression were higher in adolescents than in emerging adults. Adolescence is a period of tumultuous physical, social, and emotional changes (cf. Hurlock, 1975), which may favor the development of various addictions. This shows that the younger the Internet users, the greater the risk of developing problematic Internet use, which is consistent with other studies (e.g., Kuss et al., 2014). What is more, our study shows that younger adolescents spend much more time online. This might be a sign of the times of digital civilization, in which younger and younger users use the Internet. This group belongs to the generation referred to as post-millennials or Linksters, who are born, as it were, with access to modern technology (Blair, 2017).

As in previous studies, we found a positive relationship between time spent online and Internet addiction and depression, which is evidence of the dose-response relationship (Durkee et al., 2012). The more

we use the Internet, the higher the risk of developing Internet addiction, and conversely: the more addicted we become to the Internet, the more time we devote to it. On the one hand, the longer time spent online may indicate, in accordance with the model of Internet addiction, that we need increasingly strong stimulation and increasingly long Internet exposure, which is a result of habituation (Young et al., 2011). Time spent online may be an indicator of the loss of control over one's Internet use (Griffiths, 2000). The long time spent online may make the users more vulnerable to develop an online addiction, but since our methodology does not allow conclusions about causality, the relationship can be also the reverse.

Additionally, in the group of adolescents there was a positive relationship between Internet addiction and GPA: those who became addicted to the Internet had lower grades at school. This is in line with the clinical classification, according to which Internet addicts suffer from severe consequences of spending a long time online in several areas of their lives: social, educational, vocational, family, or relational (Beard and Wolf, 2001; Young, 1998). If they move the main part of their time to the online world, they cannot at the same time be in the real world, and so they end up neglecting their duties and ignoring the opportunities offered outside the Internet.

The hypothesis (H2) on the association between personality traits and Internet addiction has been supported. Conscientiousness was the strongest predictor of IA in both age groups, which is in line with other studies (e.g., Blachnio and Przepiorka, 2016; Kuss et al., 2013a,b) suggesting that a low-conscientiousness person is likely to use the Internet in an excessive way. Assumptions concerning the relationship between conscientiousness and Internet use were confirmed in both groups. Even longitudinal studies (Stavropoulos et al., 2016) confirmed the preventive role of conscientiousness against IA and the stability of this role throughout the developmental period. Furthermore, as in other studies (e.g., Andreassen et al., 2013; Durak and Senol-Durak, 2014), agreeableness was a significant negative predictor of IA in both groups: adolescents and emerging adults. Those who can be described as tolerant, soft-hearted and sympathetic (McCrae and Costa, 1987), are less susceptible to Internet dependency. In the adolescent group, extraversion contributed positively to IA. Findings concerning this relationship are ambiguous: on the one hand, they point to the predictive power of high extraversion (Rahmani and Lavasani, 2011), and on the other they show its preventive role against unhealthy Internet use (e.g., Blachnio et al., 2017; Zamani et al., 2011). The differences may stem from the fact that the participants in previous studies belonged to a different age group and were mainly students. Perhaps the high level of extraversion in adolescents is conducive not only to seeking face-to-face contacts but also to building social relationships online; this may be the reason why they are more inclined to spend time online and therefore can be more prone to engage in to excessive Internet use. Perhaps in this stage of early adolescence, where reference to the peer group is significant in the process of identity formation (Brown, 1990; Collins and Steinberg, 2006), what gives a sense of belonging to and contact with a group is online activity. This remains a speculation, especially as we did not check what sites and applications the subjects used. Perhaps individuals log on to the Internet and social networking sites for social purposes. As regards other differences in terms of personality predictors of IA between the groups, intellect—which is similar to the openness to experience factor of Big Five model—was a negative predictor of IA in emerging adults. This results was consistent with previous studies, where openness to experienced was a similarly good negative predictor of IA (Blachnio and Przepiorka, 2016). It should be stressed that the association between openness to experience and IA was found in an age group ($M_{age} = 22.48$) similar to the one examined in the present study. The evidence obtained in the present study shows that personality plays an important role in explaining online addiction (Kayaş et al., 2016); however, even though there are some similarities in the patterns of predictors between the two age groups, there are also some differences that cannot be disregarded and should be taken into consideration in

constructing preventive programs as well as in future studies.

As regards associations between FTP and IA, H3 was only partially supported. The results showed that FTP (both FTP long and FTP goals) had predictive power for IA only in emerging adults. Perhaps this result can be explained by the subjects' maturity level: in adolescence, long-term thinking and taking the consequences of one's behavior into consideration is only in the process of developing (Hurlock, 1975). This result can be considered more broadly in the light of the mature theory of mind (Wellman, 1990), which points to the fact that the ability to understand various mental states, such as intentions, emotions, or perception develops with age. FTP and its motivational consequences (de Bilde et al., 2011) are related to better stress coping and better adjustment (Bolotova and Hachaturova, 2013; Simons et al., 2004); therefore, individuals who have long FTP can achieve higher life satisfaction (Zaleski et al., 2001). Unexpectedly, FTP goals contributed positively to IA in emerging adults. But if we look at this attribute as focus on the task or the pursuit of one's intrinsic motivation, it may turn out to be maladaptive in the case of individuals addicted to the Internet: an addicted person will persistently strive to satisfy their need to use the Internet. We found that adolescents have shorter FTP in comparison with emerging adults, which is why they may have more difficulties taking the future into account in the present (cf. Creten et al., 2001). They can be more likely to engage in unhealthy behaviors, including excessive Internet use.

4.1. Limitations

The present study has some limitations that should be discussed. Foremost among them is the use of self-report methods: the participants evaluated their Internet use subjectively. Secondly, the present study is based on the cross-sectional approach. This kind of analysis do not make it possible to determine the causal direction of the relationship between variables. Thirdly, different types of Internet use behavior were not examined separately, and in future research the years of Internet use or the age of Internet use initiation should be included as variables. The recommendation for the future is to perform longitudinal studies in order to investigate this issue further, especially in the relationship between depression and IA. As there certain online activities are particularly addictive (cf. Van Rooij et al., 2010), activity pattern should be taken into account in future studies. Moreover, samples should include more age groups; this would make it possible to assess the patterns of individual characteristics related to IA. Another potential limitation that we could mention is the possible lack of psychometric equivalence of the instruments used across the age groups. In future studies it would be advisable to examine their equivalence. Beside personality traits, it would be interesting to examine social competencies and social functioning in a close and distal group, such as family, peers, and the school community.

4.2. Conclusion

In the present study we investigated depression, personality traits, and future time perspective as possible key characteristics in assessing pathological Internet use. The obtained findings highlighted some characteristics that may be important to better understand the phenomenon of IA. Regardless of age differences, there are some universal factors that significantly contribute to IA. The factors universal across the two groups, making individuals more vulnerable to IA, include depression, low agreeableness, and low conscientiousness. There are some age-specific IA predictors as well, however. FTP dimensions and intellect had predictive power for IA in the case of emerging adults, while extraversion had such power in the case of adolescents. The present study may serve as the basis for designing prevention programs targeted at young people particularly vulnerable to the risk of depression and Internet addiction. Research results show the important role of mental health professionals, who can educate young people and

intervene to prevent them from developing Internet addiction.

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Conflict of Interest

Authors declare no conflicts of interest.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2018.12.086.

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