

Are self-regulation and depressive symptoms predictors of problematic Internet use among first year university students?

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ABSTRACT

Within the framework of Bandura's theory, problematic Internet use is the product of deficient self-regulatory processes. It has previously been shown by several studies that psychosocial disorders such as anxiety or depression make people inclined to develop maladaptive behaviors. The aim of this study was to investigate whether self-regulation skills and depressive symptoms predict generalized problematic Internet use (GPIU). The study was conducted among university students using Caplan's model of GPIU. Previous findings related to self-regulation skills and GPIU among university students have not produced consistent results. A cross-sectional design was employed to assess the study objective. First year university students from Slovakia (n=814) completed the Short Self-Regulation Questionnaire, Modified Beck Depression Inventory and Generalized Problematic Internet Use Scale 2. Linear regression models were built to explore whether self-regulation and depressive symptoms predict problematic Internet use. No gender differences were found regarding the pattern of associations between self-regulation and GPIU nor between depressive symptoms and GPIU. Higher levels of depressive symptoms positively predicted GPIU ($p < 0.001$). Self-regulation negatively predicted GPIU ($p < 0.001$). Gender was not associated with GPIU. This study showed that problems with self-regulation skills as well as depressive symptoms might lead to problematic Internet use.

Keywords: *Self-regulation, generalized problematic Internet use (GPIU), depressive symptoms, university students.*

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1. Introduction

The Internet has become the most widely and frequently used media over the last two decades (De Leo & Wulfert, 2013; Kraut et al., 1998). It has been shown that apart from the many benefits that it has brought to individuals and societies, it could also be associated with unhealthy behaviours and negative health outcomes. Moreover, it could even be a source of a completely new pathology (Beard, 2005; Davis, Flett, & Besser, 2002; Young, 1998). Recent research has shown that university students and especially male students are a group at high risk for developing unhealthy behaviour regarding Internet use (Morahan-Martin & Schumacher, 2000). Estimates of problematic Internet use among university students have been shown to vary between 6% and 19% internationally, depending on the different conceptualizations and measures applied (Niemz, Griffiths, & Banyard, 2005; Zhu & Wu, 2004).

Despite the growing research on the possible negative aspects of Internet use and its determinants, no consensus has been reached regarding an exact definition of unhealthy Internet use behaviour. However, different definitions, conceptualizations and varying terminology have been developed and operationalized for empirical research (Davis, 2001; Morahan-Martin, 2005; Young, 1998). In particular, considerable debate has been dedicated to the issue of pathological/problematic Internet use (PIU). In his influential study, Davis (2001) has argued that PIU needs a theory-based approach within which specific and generic forms of problematic Internet use (GPIU) can be distinguished. Davis (2001) has suggested that specific PIU can be understood as a transformation of addictive behaviors such as gambling into the virtual environment of the Internet and is not conceptually different from real life addictive behaviour. On the other hand, GPIU can be understood as a completely new phenomenon where the Internet and especially the complexity of its virtual social reality becomes a source of problems due to its uniquely anonymous social context.

Davis (2001) has proposed a theoretical model based on the cognitive – behavioral approach to address GPIU (Bandura, 1991). This model has been further elaborated and empirically tested for validity by Caplan (2002; 2010). Within these validation studies, causal mechanisms (Caplan, 2010) and correlates (Caplan, 2002) of GPIU have been formulated and explored. Applying the structural equation modeling method, this research has identified several variables that together represent a causal model for the onset and development of a vicious cycle within GPIU. This causal model consists of the following components: preference of online interaction to face to face interaction

(POSI), using the Internet for mood regulation, cognitive preoccupation with the Internet when offline, compulsive Internet use and finally negative outcomes related to Internet use. The key variable of the proposed causal mechanism for developing GPIU is the preference of online communication to communication face to face. Such a preference has been found to be related to the cognitive and behavioral aspects as well as the negative consequences of GPIU (Caplan, 2002).

Yet, contrary to this, it has been suggested that this preference alone is not sufficient for developing GPIU (Morahan-Martin & Schumacher, 2003). Other risk factors, mainly of a psychosocial nature, must also be present (Morahan-Martin, 1999). These have been identified as depression, social anxiety, shyness and other variables linking an individual to his/her social world (Morahan-Martin, 1999). Some studies have shown that these variables are associated with GPIU and additional research has emphasized their predictive power in the population of university students (e.g. De Leo & Wulfert, 2013). However, other studies applying longitudinal designs have suggested that the relationship could be the other way around and that it is GPIU that causes depression and loneliness (Van den Eijnden, Vet, Vermulst, & Van de Mheen, 2009). While longitudinal studies provide stronger methodological evidence for the direction of the relationship, additional variables are needed to understand the actual development of GPIU. In particular, it might be important to address self-regulatory processes and self-control that has been shown to be closely associated with many healths related behaviours within the socio-cognitive model (Bandura, 1991).

The current study aims to contribute to the research of GPIU by addressing the individual differences in self-regulatory processes as potential risk factors for developing GPIU and maintaining the vicious cycle once developed.

Self-regulation has been defined as “the capacity to plan, guide, and monitor one’s behaviour flexibly in the face of changing circumstances” (Brown, 1998, p. 162). Carver and Scheier (1982) define self-regulation as an effortful ability to make plans and use goal-directed behavior to achieve desired outcomes. This includes delaying gratification and involves monitoring one's current state, which is then compared with the desired state or goal. One source of potentially unhealthy behaviour connected to the Internet could be attributed to the fact that it provides instant gratification and immediate positive reinforcement of behavior. While the role of deficient self-regulation of Internet use has already been acknowledged as a part of the vicious cycle within GPIU, defined as cognitive preoccupation and compulsive use (Caplan, 2010), the role

of individual differences in general self-regulation concerning its direct and indirect effect on the development of GPIU has been less explored.

The onset of problematic Internet behaviours could also thus be indicative of problems in self-regulation, which is in line with Caplan (2002) 's model. Therefore, deficient self-regulation might indeed precede the actual development of GPIU (Gailliot & Baumeister, 2007).

It has been previously shown that psychosocial disorders such as stress, anxiety or depression make people inclined to the development of maladaptive behaviors that might eventually lead to various negative outcomes (eg. Morahan-Martin & Schumacher, 2003; Van den Eijnden, Vet, Vermulst, & Van de Mheen, 2009). Supportive data for this assumption can be found in studies of lonely and depressed individuals who are more likely to engage in synchronous functions of the Internet (Caplan, 2003). Thus, the exploration of individual differences in self-regulation and their potential moderating role on established psychosocial factors, especially depression, could significantly improve the understanding of the underlying mechanism for the development and persistence of GPIU. Furthermore, individual differences in self-regulation could be specifically and differently related to individual parts of the vicious cycle. This could vary from preference of online interaction to failing to produce an adaptive response once negative consequences of Internet use have taken place and started to interfere with everyday life.

Most of the research on problematic Internet behaviour among university students has been conducted in the USA or in Western Europe. Less is known about this problematic behavior among the students in former communistic countries of Central and Eastern Europe.

Based on the reviewed literature concerning unhealthy behaviour of Internet use, the tenets of the socio-cognitive approach (Bandura, 1991) and Caplan (2002)'s model of GPIU, the first aim of the current study is to analyze whether gender, depression and self-regulation are predictors of overall GPIU as well as its components individually. The second aim is to explore the mechanisms that could bring more insight into the process of developing GPIU by testing the possible moderation effects of gender and self-regulation between depression and GPIU and its individual components.

Research that examines the predictors and moderators of problematic behaviour forms an important background for prevention programs.

2. Methods

This study is part of a larger study SLiCE (Student Life Cohort in Europe). SLiCE is a multinational ongoing longitudinal study, which has currently enrolled the first wave of an international cohort of first year university students from several European countries. The SLiCE study has developed from the previous collaborative research activities within the Cross-National Student Health Survey, which was conducted in May 2008 (El Ansari et al., 2007).

2.1 Sample

This study is based on the data of first year university students in Slovakia. Three universities from Eastern Slovakia took part in this study – PJ Safarik University, the University of Veterinary Medicine, the Technical University and Presov University. PJ Safarik University provided access to the e-mail addresses of all first year students enrolled at the university. From a total of 2031 students, 294 students filled out the questionnaire resulting in a response rate of 14.47%. In order to obtain a higher sample size and more statistical power for statistical analysis, the project was presented to students at each university during regular lectures and seminars. Students were encouraged to participate in the survey by an invitation email and asked to fill out the online questionnaires. In total 1272 students were approached and 817 completed the survey resulting in a response rate of 64.22%. Student participation in the study was anonymous and by filling out the survey, participants granted their informed consent to process their data. They were also informed that they could terminate participation at any point while filling in the questionnaire. No incentives were provided. The questionnaire was approved by the Institutional Review Boards of individual participating universities. The final sample consisted of 817 students, 75.2% were females and the mean age was 19.6 (0.81).

2.2 Measures

Primary outcome measures

The primary outcome variable was problematic Internet use (GPIU). GPIU was assessed by the Generalized Problematic Internet Use Scale 2 (Caplan, 2010), which consists of 5 subscales (Preference for online social interaction, Mood regulation, Cognitive preoccupation, Compulsive Internet use, Negative outcomes). Participants rate their agreement with each item on a scale ranging from 1 (strongly disagree) to 5

(strongly agree). Cronbach’s alpha for each subscale of the Generalized Problematic Internet use ranged from 0.75 to 0.91 (Table 1). Mean scores were calculated for each subscale (Table 1).

Subscale (no. items)	Cronbach’s alpha	Mean (SD)
Preference for online social interaction (3)	.753	7.01(4.33)
Mood regulation (3)	.867	12.39(6.09)
Cognitive preoccupation (3)	.877	7.56(5.34)
Compulsive Internet use (3)	.878	7.65(5.45)
Negative outcomes (3)	.875	6.08(4.71)
Sum score (15)	.906	40.31(19.32)

Table 1. Descriptive characteristics of The Generalized Problematic Internet Use Scale II

Covariates

From the demographic data, age and gender were collected. In order to assess self-regulation skills, the Short Self-Regulation Questionnaire was used (Carey, Neal, & Collins, 2004). Items are scored on a 1–5 scale (strongly disagree–strongly agree) and summed to create the total score. A higher score indicated a higher level of self-regulation skills. Cronbach’s alpha was 0.90.

Depressive symptoms were measured using a modified version of the Beck Depression Inventory (M-BDI) (Schmitt et al., 2003). In this measure students were asked to describe how often they had experienced each of the 20 depressive feelings during the past few days on a 6-point scale (from 0= "never" to 5= "almost always"). The M-BDI score was obtained by summing up the answers of individual questions. A higher score indicated a higher level of depressive symptoms. Cronbach’s alpha in this sample was 0.91.

2.3 Statistical analyses

The differences between genders were tested using a t-test for independent samples. Next, linear regression was employed to explore the relationships between the predictors (self-regulation, depressive symptoms) and GPIU (sum score and 5 factors score). This analysis was carried out while controlling for the demographic variables of gender and age. Finally, the potential contribution of the interaction terms of gender and depressive symptoms, gender and self-regulation and self-regulation and depressive symptoms were tested. Only significant interactions were reported and are shown in the tables. All analyses were conducted using SPSS 20.

3. Results

Table 2 depicts selected characteristics of the study population. The majority of the participants were females, which generally reflects the distribution of gender at the universities where the data were collected. The mean self-regulation score was found to be higher among males while the mean score of depressive symptoms was higher among females. However, these differences were not found to be statistically significant.

	Male 24.8%	Female 75.2%	Total	p
Mean age [year (SD)]	19.50(1.17)	19.68(1.56)	19.61(1.42)	.33
Self-regulation [mean (SD)]	113.09(14.36)	111.46(13.79)	111.89(13.97)	.21
Dep. symptoms [mean (SD)]	45.42(12.47)	47.23(13.95)	46.71(13.64)	.16

Table 2. Selected characteristics of the study population

3.1 Linear regression analysis for variables predicting problematic Internet use (GPIUS2 sum score)

The first model accounted for the largest amount of variance in GPIU (15.3%). Gender and age were found not to be related to GPIU. Self-regulation contributed significantly to the model and negatively predicted the GPIU. Depressive symptoms significantly positively predicted the sum score of GPIU (Table 3).

	Beta	T	p
Age	-.058	-1.436	.152
Gender	-.058	-1.423	.155
Self-regulation	-.170	-3.867	<0.001
Depressive symptoms	.288	6.533	<0.001

$r^2 = 15.3\%$

Table 3. Summary of linear regression analysis for variables predicting problematic Internet use (GPIUS2 sum score)

3.2 Linear regression analysis for variables predicting preference of online social interaction (POSI)

The following models addressed individual components of GPIU separately. In the first of these models, gender was found to be related to the preference of online

interaction. The analysis showed that female students were less likely to report the preference of online social interaction. Age was not related to the preference of online social interaction (Table 4). Self-regulation did not predict the preference of online social interaction, whereas depressive symptoms positively predicted the preference of online social interaction (Table 4). However, the interaction term of self-regulation and depressive feelings significantly contributed to the explained variance of the preference of online social interaction. The association between depressive symptoms and the preference of online social interaction was found to be less pronounced when self-regulation was present (Table 4).

	Beta	T	p
Age	-.063	-1.541	.124
Gender	-.083	-2.022	.044
Self-regulation	.146	1.133	.258
Depressive symptoms	.814	2.866	.004
Self-regulation*Depressive symptoms	-.558	-2.137	.033

$r^2 = 9.3\%$

Table 4. Summary of linear regression analysis for variables predicting preference of online social interaction (POSI)

3.3 Linear regression analysis for variables predicting use of the Internet for mood regulation

Female students were more likely to report use of the Internet for mood regulation. Age was not associated with the use of the Internet for mood regulation (Table 5). Self-regulation did not predict the use of the Internet for mood regulation but depressive symptoms positively predicted the use of the Internet for mood regulation (Table 5).

	Beta	T	p
Age	-.025	-.608	.543
Gender	.113	2.752	.006
Self-regulation	-.056	-1.263	.207
Depressive symptoms	.275	6.169	<0.001

$r^2 = 10.7\%$

Table 5. Summary of linear regression analysis for variables predicting use of the Internet for mood regulation

3.4 Summary of linear regression analysis for variables predicting compulsive use of the Internet

Gender was not related to the compulsive use of the Internet. However, it was found that age negatively predicted compulsive use of the Internet (Table 6). Self-regulation

negatively predicted compulsive use of the Internet (Table 6) and depressive symptoms were found to be a positive predictor of compulsive use of the Internet (Table 6).

	Beta	T	p
Age	-.085	-2.048	.041
Gender	-.080	-1.928	.054
Self-regulation	-.120	-2.658	.008
Depressive symptoms	.189	4.175	<0.001

$r^2 = 7.9\%$

Table 6. Summary of linear regression analysis for variables predicting compulsive use of the Internet

3.5 Summary of linear regression analysis for variables predicting cognitive surfeit of Internet use

The results showed that female students were less likely to report cognitive preoccupation. Age was not associated with the cognitive surfeit of Internet use (Table 7). Self-regulation was negatively associated with cognitive preoccupation and depressive symptoms were positively associated with the cognitive surfeit of Internet use (Table 7).

	Beta	T	p
Age	-.025	-.616	.538
Gender	-.104	-2.549	.011
Self-regulation	-.219	-4.942	<0.001
Depressive symptoms	.166	3.740	<0.001

$r^2 = 11.3\%$

Table 7. Relationship between self-regulation, depressive symptoms and cognitive surfeit of Internet use

3.6 Summary of linear regression analysis for variables predicting negative consequences of Internet use

The final analysis showed that male students were more likely to report negative consequences of Internet use when compared to female students. Age was not associated with negative consequences of Internet use (Table 8). No association was found between self-regulation and negative consequences of Internet use while depressive symptoms were positively associated with negative consequences of Internet use (Table 8). The interaction effect of self-regulation and depression on negative consequences of Internet use was found to be significant suggesting a

possible moderating effect. The association was found to be less pronounced when self-regulation was present (Table 8).

	Beta	T	p
Age	-.042	-1.024	.306
Gender	-.119	-2.923	.004
Self-regulation	.135	1.061	.289
Depressive symptoms	.910	3.244	.001
Self-regulation*Depressive symptoms	-.624	-2.413	.016

$r^2 = 13.2\%$

Table 8. Summary of linear regression analysis for variables predicting negative consequences of Internet use

4. Discussion

The aim of this study was twofold. Firstly, it was to address the prediction of self-regulation, depressive symptoms and generic problematic Internet use (GPIU) after controlling for age and gender. The second aim was to examine whether gender moderated the relationship between self-regulation and GPIU and between depression and GPIU. It also examined whether self-regulation moderated the relationship between depression and problematic Internet use. Given that previous research had identified university students as at risk for developing unhealthy behaviours regarding Internet use (Nalwa & Anand, 2003), this study focused on this group.

Generally, both depression and self-regulation were found to predict GPIU after statistically controlling for the selected demographic variables (age and gender) in individual linear regression models. From the controlling variables, age was not found to predict the GPIU sum score nor the GPIU subscales except for the compulsive use of the Internet. Specifically, younger students showed more compulsive use of Internet in comparison to older students. This partial finding is in line with other research indicating that younger students are more vulnerable to problematic Internet use (Morahan-Martin & Schumacher, 2000; Scherer, 1997).

Secondly, no significant effect of gender differences was found in relation to sum the score in the Generalized Problematic Internet Use Scale 2 (GPIUS2). However, certain gender differences were detected with respect to the individual factors of the GPIUS2. Male students were more likely to report a preference of online social interaction, cognitive preoccupation and negative consequences of Internet use compared to female students. These findings indicate that a different pattern of problematic Internet

use for genders might exist. These findings are consistent with previous studies (Li & Chung, 2006; Tahiroğlu, Celik, Uzel, Ozcan, & Avci, 2008).

In accordance with Caplan's (2010) model, the reported preference of online social interaction may indicate feeling better or safer online than in a face-to-face interaction. This suggests having more confidence in socializing online than offline. Female students often have better communication skills than males with males perhaps more inclined to develop a preference for online social interaction. On the other hand female students were more likely to report use of the Internet for mood regulation. These findings suggest that female students may use the Internet differently from males but with the same aim to regulate their affect or simply to feel better.

In this study, self-regulation was shown to be a consistent and significant predictor of GPIU and its partial aspects. Self-regulation was found to significantly negatively predict the GPIU total score. Individual differences in self-regulation have been previously shown to play a crucial role in the development and maintenance of various unhealthy behaviours and addictive behavior. In line with the growing number of studies (e.g., La Rose, Lin, & Eastin, 2003; Shaffer, Hall, & Vander Bilt, 2000; Young, 1998) this study has confirmed the potentially important role of self-regulation in relation to GPIU and, via its components, possibly the development of GPIU. In addition to the exploration of self-regulation as the main effect, the indirect moderating effect of self-regulation was also addressed. This study has shown certain support for a moderating effect of self-regulation between depressive symptoms and the preference of online social interaction as well as between depressive symptoms and negative consequences of Internet use. Regarding the remaining subscales of GPIU no such effect was found. These findings are in line with the theoretical assumptions of Caplan (2010) in which the preference of online social interaction features at the beginning of the vicious cycle and the negative consequences at the final phase.

However, it is worth noting that the association between depressive symptoms and the preference of online social interaction or negative consequences of Internet use was less pronounced when self-regulation was included. Based on these data, it seems that ineffective self-regulation leads to the formation of media consumption habits.

Another important aim of this study was to investigate the prediction of depressive symptoms on problematic Internet use (GPIU). Higher levels of depressive symptoms were indeed found to be a predictor of problematic Internet use factors including the total score of GPIU. Generally, problematic consumption behaviour has been linked to

mental health problems such as perceived stress, depression and low self-esteem (eg. Morahan-Martin & Schumacher, 2000; Morahan-Martin, 2005). Depressive symptoms (based on the DSM IV) include sadness, anxiety or empty feelings; decreased energy; loss of interest in usual activities; sleep disturbances; weight gain/loss; feelings of worthlessness; suicidal thoughts; difficulty in concentrating or making decisions. Thus, depression may play an important role in “media consumption” behaviour similarly to other risk consumption behavior. Psychosocial problems such as loneliness or depression predispose individuals to develop maladaptive Internet-related cognitions and behaviors that ultimately result in negative outcomes (Davis, Flett, & Besser, 2002). For individuals who are lonely, anxious and have low self-esteem or who suffer from various forms of psychological distress, they are more likely to develop a preference for online social interaction. Online social interaction could be an alternative or option to not lose contact with people. This kind of communication is much safer, easier, requires less energy and is potentially more comfortable than face-to-face communication. Such individuals might perceive online interaction as less threatening and perceive themselves to be more socially efficacious when interacting with others online (Caplan, 2003; 2005; 2007). Individuals who are not psychosocially healthy (e.g., are depressed) have difficulty not only maintaining healthy social interaction in their real lives but also regulating their Internet use.

Bandura (1991) has proposed that depressed people are less capable of engaging in effective self-regulation, which means that they are generally less effective in regulating their thoughts and in changing behavior and thus avoiding negative outcomes. The results from this study have shown that students with higher levels of depressive symptoms were also less effective at controlling and regulating an obsessive thought pattern involving Internet use such as: “I can’t stop thinking about going online”. This was also shown in compulsive Internet use: “I have difficulty controlling the amount of time I spend online, I find it difficult to control my Internet use or When offline, I have a hard time trying to resist the urge to go online.” Thus, depression may trigger both the rational, “high road” to habitual media selection and also the emotional, uncontrollable “low road” to unregulated media usage (Bandura, 1991).

5. Limitations

There are several limitations to this study that should be mentioned. The data are entirely cross-sectional, correlational and inferences about the causal directions of the association between depressive symptoms and problematic

Internet use are not warranted. However, others have found similar associations using longitudinal study designs (Ko, Yen, Chen, Yeh, & Yen, 2009) and the results are generally in accordance with the current model of GPIU (Caplan, 2010). In this study we used online data collection, which resulted in a low response rate and a significantly higher portion of female students in the final sample. The sample comprised only of first-year students. Thus, any generalizations from the findings for all students should be undertaken cautiously. Future research should address these limitations.

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