

The relationship between problematic internet use and depression, anxiety in university students: a systematic review

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Abstract

Every day we are exposed to modern technology which influences our behaviour and perception to a greater or lesser extent. In connection with the use of technology, the prevalence of mental disorders has increased since 2015. The aim of this study was to make a systematic review that covers the existing knowledge on problematic internet behaviour in relation to anxiety and/or depression in university students. The review focused on two types of research studies: from China and from other foreign countries. Papers from 'other foreign countries' were taken from the Medline Database of Palacký University Olomouc. Papers from China were taken from the Elsevier ScienceDirect Database of Sichuan University of Science & Engineering. The following review inclusion criteria were used: research studies from the past 5 years (2016–2021), quantitative research, studies published in English, focus consistent with the purpose of our study. A review table and a resulting diagram were made based on an analysis of research studies showing the relationship between the key variables and other monitored variables in the studies selected. The analysis of research studies confirmed a correlation between internet addiction and depression as well as anxiety. Other variables in the context of internet addiction included time spent on the internet, level of self-esteem, insomnia, alcohol consumption, well-being, physical activity, and impulsiveness. One

of the studies did not confirm a correlation with depression and one with sleep disorders. The results of the systematic review can be used in primary prevention in tertiary education or university psychological counselling.

Keywords: internet addiction, depression, anxiety, university students.

Vztah problémového používání internetu a deprese, úzkosti u studentů vysokoškolských studentů: systematický přehled

Abstrakt

Každý den jsme vystaveni moderním technologiím, které ve větší či menší míře ovlivňují naše chování a vnímání. V souvislosti s používáním technologií se od roku 2015 zvýšil výskyt duševních poruch. Cílem této studie bylo zpracovat systematický přehled, který by zahrnoval dosavadní poznatky o problematickém chování na Internetu v souvislosti s úzkostí a/nebo depresí u vysokoškolských studentů. Zaměřili jsme se na dva typy výzkumných studií: z Číny a z dalších zemí. Práce ze zahraničí byly převzaty z databáze Medline Univerzity Palackého v Olomouci. Příspěvky z Číny byly převzaty z databáze Elsevier ScienceDirect Sichuan University of Science & Engineering. Pro zařazení do přehledu byla použita následující kritéria: výzkumné studie z let 2016–2021, kvantitativní výzkumný design, studie publikované v angličtině, se zaměřením, které odpovídalo účelu této studie. Na základě analýzy výzkumných studií byla vytvořena přehledová tabulka a výsledný diagram, který ukazuje vztah mezi klíčovými proměnnými a dalšími sledovanými proměnnými ve vybraných studiích. Analýza výzkumných studií potvrdila souvislost mezi závislostí na internetu a depresí i úzkostí. Další proměnné v souvislosti se závislostí na internetu zahrnovaly čas strávený na internetu, úroveň sebeúcty, nespavost, konzumaci alkoholu, pohodu, fyzickou aktivitu a impulzivitu. Jedna ze studií nepotvrdila souvislost s depresí a jedna s poruchami spánku. Výsledky systematického přehledu lze využít v primární prevenci v terciárním vzdělávání nebo ve vysokoškolském psychologickém poradenství.

Klíčová slova: závislost na internetu, deprese, úzkost, vysokoškolští studenti.

DOI: 10.5507/epd.2022.006

Introduction

With the advent of the new era, psychological problems have attracted more and more attention. In 2015, the World Health Organization (2015) pointed out an increase in mental disorders associated with the overuse or inappropriate use of modern technology.

The development of the internet has brought numerous benefits in our society. However, it also causes the Internet Addiction Disorder (IAD). After IAD was first coined by Ivan Goldberg in 1995, it has become a social-psychological problem and many researchers have worked on this topic. According to the American Psychiatric Association (2013), internet addiction is accompanied with similar symptoms as substance addictions including the following: loss of control and tolerance, narrow interest, neglect of other activities and withdrawal symptoms. IAD affects several areas of the life of an individual including the education, work or social areas (Young, 1996). It can lead to marriage breakdown, job losses, financial problems, academic failures and even death. Many studies indicate that IAD is a multidimensional construct which has many dependencies such as mental health, age, peer influence, social support, family relationship, parental mental health, emotion dysregulation, alexithymia personality and so on. Among these factors, certain personality traits such as self-control, impulsiveness, items in the Big Five personality traits including Openness, Extraversion, Conscientiousness, Agreeableness, Neuroticism are regarded to have a close association with IAD. Currently, internet addiction is included in the fifth revision of the Diagnostic and Statistical Manual of Mental Disorders, chapter Internet Gaming Disorder (IGD). It is defined as long-term internet overuse/gaming that leads to cognitive and behavioural symptoms and affects public health (American Psychiatric Association, 2013).

Although IAD can be found in any age group and every occupation, youths are more vulnerable to IAD. More and more reports point out the addictive internet usage problem. Globally, it is estimated that 4–12% of adolescents may demonstrate IAD. In China, the rates ranged from 2.4% to 5.5% in Hunan Province and to 6.4% in Shanxi Province (Di, Gong, Shi, Ahmed & Nandi, 2019). In the USA and Europe, the prevalence of internet addiction ranged between 1.5 and 8.2% of the population.

Chinese university students suffer from the most prominent psychological problems such as internet addiction, depression and anxiety. In recent years, many research studies on university students' mental health have shown that their mental health is far lower compared with other groups of the same age. In general, Chinese college students show a high incidence of mental problems, it is estimated that it could be about 16–30% of students who manifest different degrees of psychological problems, such as depression, anxiety, obsessive-compulsive tendencies, interpersonal relationship problems, or other mental health problems (Jiao L, Zhang H, Chen, 2007; Li, 2009; You, Lin, 2006; Liu et al. 2017).

In comorbidity with internet addiction, the depressive and anxiety disorder and attention disorder with hyperactivity were observed (Weinstein & Lejoyeux, 2010). In their study, Odacı and Çikrikci (2017) observed a positive correlation between problematic internet use and the level of depression, anxiety and stress.

Depression is defined as a condition in which an individual has feelings of dejection and gloominess and the whole world is perceived as forlorn (Comer, 1995). This is also accompanied with a loss of energy, decreased performance, anhedonia, loss of interest and motivation for at least 2 weeks (Orel et al., 2016). Anxiety is defined as a non-specific concern, feeling of being threatened involving physical symptoms such as rapid breathing, palpitation, sweating and muscle tension (Comer, 1995). Anxiety is accompanied with subjectively unpleasant and non-specific feelings of being threatened (Orel et al., 2016).

Epidemiological studies show that the prevalence of depression among university students is higher than that of the general population. The prevalence of depression among university students in China is 13.25%~79.90%, while that of the general populations only 5~6% (Gao, Ping, & Liu, 2020).

Internet addiction, depression and anxiety are a common psychological disorder among university students. Long-term depression and anxiety among university students leads to a negative emotional state which will damage their body and mind, decrease their enthusiasm for learning and cause obstacles in interpersonal communication. This has a negative impact on the development of their mental health.

1 Methodology

The research scope of this study is focused on problematic internet use/internet addiction in relation to depression and anxiety in the context of Chinese resources and resources from 'other foreign countries'. The aim of the systematic review was to analyse and synthesize selected studies identified based on a series of criteria. The partial aim was to provide an overview of the latest studies on problematic internet use as well as the influencing variables that the research studies focus on in this context.

On the basis of the existing knowledge and theoretical findings, the following question was formulated: How is problematic internet use explored in relation to the level of depression and anxiety among university students in Chinese studies and 'other foreign studies'? What other variables are examined in this context?

Search for relevant publications

The review study was conducted by means of the document analysis technique, specifically primary source texts. Relevant research studies were searched for in the Medline Database of Palacký University Olomouc and Elsevier ScienceDirect Database of Sichuan University of Science & Engineering.

The following keywords were used: internet addiction/problematic internet use, depression, anxiety, and university/college students. In the case of the Chinese database, the term Chinese university students was used from the beginning. After the selection process, a total of 107 articles were found in the Medline Database and 1,442 articles in Elsevier ScienceDirect.

During further selection, the following criteria were used:

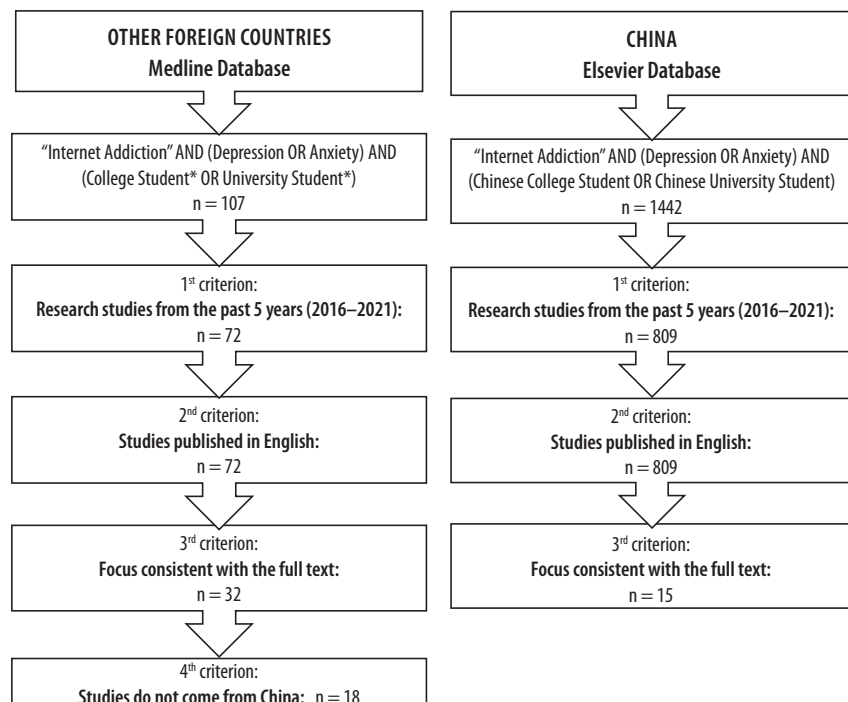
- Time period of the past 5 years (2016–2021).
- Published in English, consistent with the aim of the study and keywords.
- Quantitative design, full text availability.

Originally, we searched for the keyword internet addiction. However, Bleakley, Park and Romer (2017) claim that it is difficult to define internet addiction and different authors interpret this phenomenon in different ways. Therefore, we also included studies with similar terms such as problematic internet use, internet overuse, internet use disorder, social media use, etc. The search procedure concerning Chinese and other foreign resources and its results are shown in Figure 1.

The narrow selection included 18 articles whose topic matched our requirements from the Medline Database (other foreign countries) and 15 Chinese articles from Elsevier. However, 9 articles had to be excluded because the analyses of the abstract revealed an inconsistency with the inclusion criteria. A total of 24 publications were analysed in detail and subsequently arranged in a comparison table showing the research objective, origin of the research, number of participants, measurement tools and results.

Figure 1

Searching Flowchart – foreign countries and China



2 Results

An overview of relevant studies in relation to internet addiction, anxiety and depression among university students is shown in Table 1 including a comparison of a total of 24 articles from the Medline Database (other foreign countries) and Elsevier.

Table 1
Overview of existing research studies – foreign countries

Author, year	Aim	Country	Sample size	Assessment instrument	Main findings
Alaca, 2020	Examine the effect of internet addiction on depression and physical activity.	Turkey	215	<ul style="list-style-type: none"> Addiction Profile Index Internet Addiction Form International Physical Activity Questionnaire-Short-Form Beck Depression Inventory Neck Disability Index Pressure-Pain Threshold 	A significant correlation was confirmed between internet addiction and the level of depression, damage to the cervical region of the locomotor system, lower level of physical activity and more frequent internet use.
Anand et al., 2018	Identify the effects of excessive internet use on mental health, academic performance, competences, interests and learning objectives.	South India	2776	<ul style="list-style-type: none"> Internet Addiction Test Self-Report Questionnaire-20 	Internet use had an effect on academic performance and mental health. The following predictors of internet addiction were identified: male gender, frequency of use, time of use and time spent using the internet per day, depressive symptoms.
Berdin and Saules, 2019	Identify the correlation between the current problematic internet use and excessive alcohol consumption and depressive symptoms.	USA	550	<ul style="list-style-type: none"> Problematic internet use questionnaire Revised Chinese Internet Addiction Scale Brief Young Adult Alcohol Consequences Questionnaire Composite Measure of Problem Behaviors Scale Center for Epidemiological Studies Depression Scale 	In terms of depressive symptoms, no significant correlation was identified with internet addiction. As far as excessive alcohol consumption is concerned, it was revealed that those who consumed alcohol and over-used the internet had a higher prevalence of addiction characteristics than those who did not consume alcohol.
Gupta, Khan, Rajoura and Srivastava, 2018	The study focused on internet addiction in the context of risk factors and depression, anxiety and stress.	North India	477	<ul style="list-style-type: none"> Young's Internet Addiction Test Scale Depression, Anxiety and Stress Scale-21 Internet Usage Patterns 	The results of the study pointed to the following independent indicators of internet addiction: depression, anxiety, stress, internet usage time per week, online status.
Jain et al., 2020	The aim of the study was to explore the prevalence of internet addiction and its relationship with depression and insomnia.	India	954	<ul style="list-style-type: none"> Internet Addiction Test Patient Health Questionnaire Insomnia Severity Index 	The authors revealed a positive correlation between internet addiction and insomnia and depressive symptoms. The risk factors related to problematic use included gender, time spent online, alcohol consumption and smoking.

Author, year	Aim	Country	Sample size	Assessment instrument	Main findings
Jaiswal, Manchanda, Gautam, Goel, Aneja, and Raghav, 2020	Identify the prevalence of social anxiety disorder in the context of internet use.	India	307	<ul style="list-style-type: none"> • Social Interaction Anxiety Scale • Young's Internet Addiction Scale 	A positive correlation was found between internet addiction and the prevalence of social anxiety disorder.
Kim et al., 2017	The study analysed the prevalence of depression, anxiety and internet addiction in adults diagnosed with ADHD.	Korea	429	<ul style="list-style-type: none"> • Korean Adult ADHD Scale • Korean Wender-Utah Rating Scale • Beck Depression Inventory-II • Beck Anxiety Inventory • Barratt Impulsiveness Scale • Korean Young Internet Addiction Scale • Temperament Character Inventory-Revised 	The research concluded that adults with persistent ADHD symptoms achieved higher levels in the assessment of depression, anxiety and internet addiction.
Kitazawa et al., 2018	Correlation between problematic internet use and, for example, depression, anxiety, ADHD and sleep quality.	Japan	1336	<ul style="list-style-type: none"> • Internet Addiction Test • Pittsburgh Sleep Quality Index • Adult ADHD Self-Report Scale • Center for Epidemiological Studies – Depression • State-Trait Anxiety Inventory 	People with problematic internet use had difficulty with sleep quality, tendency to ADHD and a higher level of depressive and anxiety symptoms.
Kumar, Kumar, Badiyani, Singh, Gupta and Ismail, 2018	The aim of the study was to identify the prevalence of internet addiction and examine the correlation between excessive internet use and depression and academic performance.	India	384	<ul style="list-style-type: none"> • Young's Internet Addiction Test • Beck's Depression Inventory 	A relationship was identified between depression symptoms, academic performance and internet addiction.
Kumar, Mondal, 2018	Identify the correlation between internet use and psychopathological factors and self-esteem	India	200	<ul style="list-style-type: none"> • Young's Internet Addiction Scale • Symptom Checklist-90-Revised • Rosenberg Self-Esteem Scale 	A correlation was identified between internet addiction and the level of depression, anxiety and sensitivity in interpersonal relationships. Individuals with low self-esteem had a higher tendency to internet overuse.
Marzilli, Cerniglia, Ballarotto and Cimino, 2020	The study examined internet addiction in the context of family involvement, impulsiveness, depression and anxiety.	Italy	244	<ul style="list-style-type: none"> • Internet Addiction Test • Family Assessment Device • Adult Self Report • Barratt Impulsiveness Scale 	It was observed that persons with moderate internet addiction reported worse family relationships, higher prevalence of depressive symptoms and higher impulsiveness.

Author, year	Aim	Country	Sample size	Assessment instrument	Main findings
Ramón-Arribas, Granada-López, Martínez-Abadía, Echániz-Serrano, Antón-Solanas and Nash, 2021	Identify the prevalence of problematic internet use in the context of anxiety, depression, stress, alcohol consumption and other psychological factors in connection with mental health.	Spain	698	<ul style="list-style-type: none"> Rosenberg scale GAGE Alcohol Questionnaire DUKE-UNC-11 Questionnaire DASS-21 Questionnaire Young's Internet Addiction Test 	A correlation was identified between problematic internet use and stress, time spent on the internet, alcohol consumption, anxiety and perceived social support. On the contrary, a correlation with depressive symptoms or quality of sleep in the context of problematic internet use was not confirmed.
Scimca et al., 2017	Identify the correlation between internet addiction and abnormal illness behaviour.	Italy	278	<ul style="list-style-type: none"> Illness Behavior Questionnaire Internet Addiction Test Hamilton Depression Scale Hamilton Anxiety Scale Toronto Alexithymia Scale 	Those participants who suffered from anxiety had a tendency to excessive internet use. In terms of abnormal illness behaviour, the annoyance factor showed to be an indicator of internet addiction.
Turel, Poppa and Gil-Or, 2018	The aim was to determine whether gender and neuroticism were the key factors in the development of social network addiction.	Israel	215	<ul style="list-style-type: none"> 6-item Bergen Facebook Addiction Scale Big Five Inventory-Short Version (BFI-5) WHO Five Item Wellbeing Index 	A correlation was confirmed between problematic use of social networks and gender, neuroticism and well-being.
Vargas and Robles, 2018	Analyse the correlation between asthma, allergy, internet addiction, stress, sleep quality, depression and suicidal tendency.	USA	929	<ul style="list-style-type: none"> Young's Internet Addiction Test Center for Epidemiologic Studies Depression Scale Current Health Conditions – Asthma, Allergy Alcohol Use Disorders Identification Fagerström Test for Nicotine Dependence Inventory of College Students Recent Life Experiences Pittsburgh Sleep Quality Index Suicidal Behaviors Questionnaire-Revised 	A correlation was identified between internet addiction and depression.
Yamada, Moshier Otto, 2016	The aim of the study was to identify an indicator of the inability to restrict internet use.	USA	72	<ul style="list-style-type: none"> Depression Anxiety and Stress Scale 21 UPPS-P Impulsive Behavior Scale 10-item Distress Intolerance Index 	The authors identified an indicator of the inability to restrict internet use, which was distress intolerance. This variable is predictive of self-control failure and consequently problematic internet use. In terms of the relationship between stress intolerance and depression and anxiety, no significant correlation was identified.

Author, year	Aim	Country	Sample size	Assessment instrument	Main findings
Younes et al., 2016	The objective of the study was to explore internet addiction in connection with sleep, anxiety, depression, stress and self-esteem among medical students.	Lebanon	600	<ul style="list-style-type: none"> Young Internet Addiction Test, Insomnia Severity Index, Depression Anxiety Stress Scales Rosenberg Self Esteem Scale 	A correlation was identified between internet addiction and depression, anxiety self-esteem and sleep disorder. Specifically, between lower self-esteem scores and higher scores of depressive and anxiety symptoms.
Nie, Zhang and Liu, 2017	The aim of the study was to explore depression, self-esteem and verbal fluency functions among normal internet users, mild internet addictions and severe internet addictions.	China	316	<ul style="list-style-type: none"> Chen Internet Addiction Scale Zung Self-Rating Depression Scale Rosenberg Self-Esteem Scale 	Severe internet addiction was significantly associated with depression, low self-esteem and semantic verbal fluency problems.
Chen and Huang, 2018	The aim of the study was to explore whether the internet addiction (IA) had lower health-related quality of life in the physical, psychological, social and environment domains.	China	1452	<ul style="list-style-type: none"> Stratified Proportional Sampling Method Chen Internet Addiction World Health Organization Quality of Life Taiwan version 	The three forms of internet addiction are obsessive compulsion and interpersonal and health problems. Compulsion and interpersonal and health problems were significantly associated with lower physical health-related quality of life. Compulsion was associated with decreased psychological and environment health-related quality of life. Interpersonal and health problems resulting from internet use were associated with lower social health-related quality of life.
DJ. Gong, Shi, Ahmed and Nandi, 2019	To explore the internet addiction disorder among Chinese college students using several personality questionnaire data and the support vector machines.	China	2397	<ul style="list-style-type: none"> Scores of Social Media Addiction Scale 	The results proven relationship of degree of IA and 6 features, such as personality traits (i.e. impulsiveness, neuroticism) and self-control.

Author, year	Aim	Country	Sample size	Assessment instrument	Main findings
Shen et al., 2021	The aim of the study was to investigate the gender differences in the prevalence, risk factors and clinical correlates of internet addiction (IA).	China	8098	<ul style="list-style-type: none"> Revised Chinese Internet Addiction Scale Wender Utah Rating Scale and World Health Organization Adult ADHD Self-Report Scale Self-reporting Depression Scale Athens Insomnia Scale Self-Rating Anxiety Scale Suicidal behaviors through WeChat. 	IA is significantly associated with ADHD, insomnia and suicidal behaviours in both male and female students.
He et al., 2021	The aim of the study was to examine the epidemiology of major childhood adversities and their effects on depression and suicide attempts.	China	2755	<ul style="list-style-type: none"> A questionnaire with 10 items on major childhood adversities, one item on suicide attempts Zung Self-Rating Depression Scale 	Severe internet addiction in the survey sample showed the highest tendency towards depressive symptoms and lowest self-esteem scores.
Li, Niu, Wang, Chang, Mei and Griffiths, 2021	The aim of the study was to examine the relationship between internet addiction (gaming disorder), depression, alexithymia, boredom and loneliness.	China	1635	<ul style="list-style-type: none"> Gaming Disorder Test Patient Health Questionnaire Toronto Alexithymia Scale Single-item measures of loneliness and boredom 	Depression, alexithymia, boredom and loneliness were significantly and positively associated with GD.

Conclusions

Based on a systematic review of publications in the Medline Database of Palacký University Olomouc and Elsevier Database of Sichuan University of Science & Engineering, the following conclusions were made.

Figure 2 shows the correlations suggested by the research studies presented in the review table. In a total of 64% of the studies, a significant negative correlation was confirmed between internet addiction and the prevalence of depressive symptoms. In 36% of the studies, a correlation was identified between internet addiction and anxiety.

Only in one study a correlation between internet addiction a depression was not confirmed (Berdin & Saules, 2019).

A frequent variable monitored in connection with internet addiction is the time spent on the internet. Students who spend more time on the internet have a greater tendency to internet addiction. Less than 23% of the studies focused on the relationship between internet addiction and the level of self-esteem and confirmed a negative correlation in the observed cohort of university students. Another personality variable that appeared in the studies was impulsiveness and neuroticism. In four of the studies, internet addiction was correlated with sleep disorders; only in one study this relationship was not confirmed. This was a study by Ramón-Arbués et al. (2021) which confirmed a correlation between internet addiction and anxiety but not between problematic internet use and sleep disorders.

The analysis of the research studies shows that the level of stress and well-being is also a risk factor in the context of the prevalence of internet addiction symptoms. Internet addiction also affects the level of physical activity and decreases academic performance.

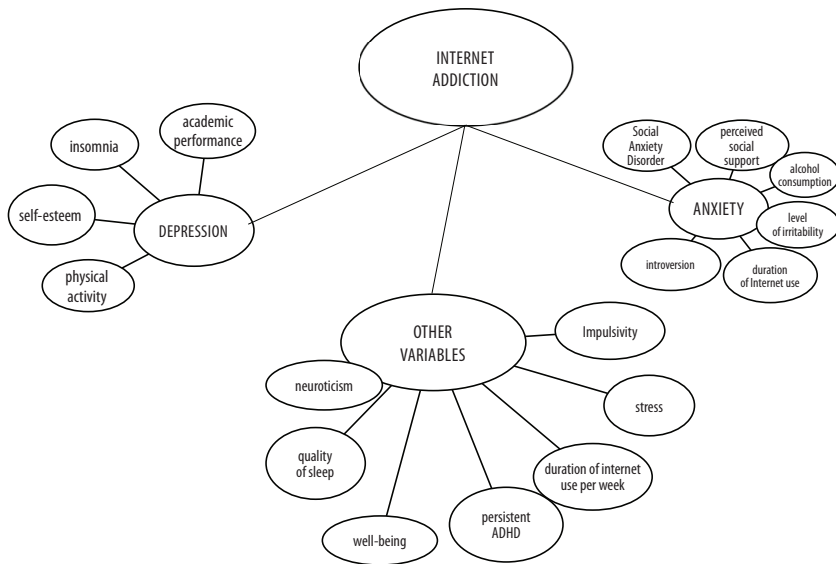
One of the studies monitored additional variables such as neuroticism, stress intolerance, loneliness and boredom. Yamada, Moshier, Otto (2016) concluded that internet addiction was correlated only with stress intolerance, while depressive and anxiety symptoms did not play a role.

According to the analysis of the Chinese resources, as suggested by the chart above, internet addiction was associated with depression, low self-esteem, decreased physical activity, symptoms of ADHD, insomnia and suicidal behaviours.

The presented review study reports on the current research on internet addiction and the prevalence of depression and anxiety. Equally interesting are other variables that occur in the research studies and that could be used in primary prevention as part of university psychological counselling.

Figure 2

Relationship between problematic internet use and depression and anxiety



References

- Alaca, N. (2020). The impact of internet addiction on depression, physical activity level and trigger point sensitivity in Turkish university students. *Journal of Back & Musculoskeletal Rehabilitation*, 33(4), 623–630.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders*, 5th ed. American Psychiatric Association, Washington D.C.
- Anand, N., Jain, P. A., Prabhu, S., Thomas, Ch., Bhat, A., Prathyusha, P. V., Bhat, S. U., Young, K., & Cherian, A. V. (2018). Prevalence of excessive internet use and its association with psychological distress among university students in South India. *Industrial Psychiatry Journal*, 27(1), 131–140. https://doi.org/10.4103/ipj.ipj_28_18
- Berdin, A. N., & Saules, K. K. (2019). Combined Use of Alcohol and the Internet: Associated Features. *Substance Use & Misuse*, 54(13), 2099–2107. <https://doi.org/10.1080/10826084.2019.1630440>
- Bleakley, A., Park, S., & Romer, D. (2017). Internet Addiction. In *Treating and Preventing Adolescent Mental Health Disorders: What We Know and What We Don't Know*. New York, NY: Oxford University Press, p. 585. Retrieved from <https://www.oxfordclinicalpsych.com/view/10.1093/med-psych/9780199928163.001.0001/med-9780199928163-chapter-28>
- Comer, J. R. (1995). *Abnormal psychology – 3rd edition*. New York: W. H. Freeman and Company.

- Di, Z., Gong, X., Shi, J., Ahmed, H. O. A., & Nandi, A. K. (2019). Internet addiction disorder detection of Chinese college students using several personality questionnaire data and support vector machine. *Addictive Behaviors Reports*, 10. <https://doi.org/10.1016/j.abrep.2019.100200>
- Gao, W., Ping, S., & Liu, X. (2020). Gender differences in depression, anxiety, and stress among college students: A longitudinal study from China. *Journal of Affective Disorders*, 263, 292–300. <https://doi.org/10.1016/j.jad.2019.11.121>
- Gupta, A., Khan, A., Rajoura, O., & Srivastava, S. (2018). Internet addiction and its mental health correlates among undergraduate college students of a university in North India. *Journal of Family Medicine & Primary Care*, 7(4), 721–727. https://doi.org/10.4103/jfmipc.jfmipc_266_17
- He, Y., Zhang, Y., Cui, X., Zhong, Y., He, W., Liu, J., Luo, X., & Gong, J. (2021). Epidemiology of major childhood adversities and its effect on depression and suicide attempts in Chinese college students. *Journal of Affective Disorders*, 281, 331–337. <https://doi.org/10.1016/j.jad.2020.12.031>
- Chern, K.-C., & Huang, J.-H. (2018). Internet addiction: Associated with lower health-related quality of life among college students in Taiwan, and in what aspects? *Computers in Human Behavior*, 84, 460–466. <https://doi.org/10.1016/j.chb.2018.03.011>
- Jain, A., Sharma, R., Gaur, K., Yadav, N., Sharma, P., Sharma, N., Khan, N., Kumawat, P., Jain, G., Maanju, M., Sinha, K., & Yadav, K. (2020). Study of internet addiction and its association with depression and insomnia in university students. *Journal of Family Medicine & Primary Care*, 9(3), 1700–1706. https://doi.org/10.4103/jfmipc.jfmipc_1178_19
- Jaiswal, A., Manchanda, S., Gautam, V., Goel, A., Aneja, J., & Raghav, P. (2020). Burden of internet addiction, social anxiety and social phobia among University students, India. *Journal of Family Medicine & Primary Care*, 9(7), 3607–3612. https://doi.org/10.4103/jfmipc.jfmipc_360_20
- Jiao L, Zhang H, Chen W. (2007). Mental health status and personality characteristics analysis of medical students. *China Journal of Health Psychology*, 15(3), 231–234.
- Kim, K. M., Nam, S., Kim, S. Y., Lee, S. M., Choi, J.-W., Kang, T., & Kim, J. W. (2017). Psychopathological, temperamental, and characteristic factors in adults with remaining childhood attention-deficit hyperactivity symptoms. *International Journal of Psychiatry in Clinical Practice*, 21(3), 236–241, <https://doi.org/10.1080/13651501.2017.1297835>
- Kitazawa, M., Yoshimura, M., Murata, M., Sato, F. Y., Hitokoto, H., Mimura, M., Tsubota, K., & Kishimoto, T. (2018). Associations between problematic Internet use and psychiatric symptoms among university students in Japan. *Psychiatry and Clinical Neurosciences*, 72(7), 531–539. <https://doi.org/10.1111/pcn.12662>
- Kumar, M., & Mondal, A. (2018). A study on Internet addiction and its relation to psychopathology and self-esteem among college students. *Industrial Psychiatry Journal*, 27(1), 61–66. https://doi.org/10.4103/ipj.ipj_61_17
- Kumar, S., Kumar, A., Badiyani, B., Singh, S. K., Gupta, A., & Ismail, M. B. (2018). Relationship of internet addiction with depression and academic performance in Indian dental students. *Clujul Medical (1957)*, 91(3), 300–306. <https://doi.org/10.15386/cjmed-796>
- Li, L., Niu, Z.-M., Wang, W., Chang, C.-Y., Mei, S.-L., & Griffiths, M. D. (2021). A network perspective on the relationship between gaming disorder, depression, alexithymia, boredom, and loneliness among a sample of Chinese university students. *Technology in Society*, 67, 101740. Retrieved from <https://doi.org/10.1016/j.techsoc.2021.101740>
- Li, W. (2009). College students' mental health level investigation and countermeasure study. *Health Medicine Research and Practice*, 6(2), 9–11.
- Liu, F., Zhou, N., Cao, H., Fang, X., Deng, L., Chen, W., ... & Zhao, H. (2017). Chinese college freshmen's mental health problems and their subsequent help-seeking behaviors: a cohort design (2005–2011). *PLoS One*, 12(10), e0185531.
- Marzilli, E., Cerniglia, L., Ballarotto, G., & Cimino, S. (2020). Internet Addiction among Young Adult University Students: The Complex Interplay between Family Functioning, Impulsivity, Depres-

- sion, and Anxiety. *International Journal of Environmental Research and Public Health*, 17(21). <https://doi.org/10.3390/ijerph17218231>
- Nie, J., Zhang, W., & Liu, Y. (2017). Exploring depression, self-esteem and verbal fluency with different degrees of internet addiction among Chinese college students. *Comprehensive Psychiatry*, 72, 114–120. <https://doi.org/10.1016/j.comppsych.2016.10.006>
- Odaci, H., & Çikrikci, Ö. (2017). Differences in Problematic Internet Use based on Depression, Anxiety, and Stress Levels. *Addicta: The Turkish Journal on Addictions*, 4(1), 51–61. <https://doi.org/10.15805/addicta.2017.4.1.0020>
- Orel a kolektiv. (2016). *Psychopatologie*. Praha: Grada.
- Ramón-Arbués, E., Granada-López, J. M., Martínez-Abadía, B., Echániz-Serrano, E., Antón-Solanas, I., & Nash, M. (2021). Prevalence and Factors Associated with Problematic Internet Use in a Population of Spanish University Students. *International Journal of Environmental Research and Public Health*, 18(14). <https://doi.org/10.3390/ijerph18147620>
- Scimeca, G., Bruno, A., Crucitti, M., Conti, C., Quattrone, D., Pandolfo, G., Zoccali, R. A., & Muscatello, M. R. A. (2017). Abnormal illness behavior and Internet addiction severity: The role of disease conviction, irritability, and alexithymia. *Journal of Behavioral Addictions*, 6(1), 92–97. <https://doi.org/10.1556/2006.6.2017.008>
- Shen, Y., Wang, L., Huang, C., Guo, J., De Leon, S. A., Lu, J., Luo, X., & Zhang, X. Y. (2021). Sex differences in prevalence, risk factors and clinical correlates of internet addiction among chinese college students. *Journal of Affective Disorders*, 279, 680–686. <https://doi.org/10.1016/j.jad.2020.10.054>
- Turel, O., Poppa, N. T., & Gil-Or, O. (2018). Neuroticism Magnifies the Detrimental Association between Social Media Addiction Symptoms and Wellbeing in Women, but Not in Men: a three-Way Moderation Model. *The Psychiatric Quarterly*, 89(3), 605–619. <https://doi.org/10.1007/s11126-018-9563-x>
- Vargas, P. A., & Robles, E. (2019). Asthma and allergy as risk factors for suicidal behavior among young adults. *Journal of American College Health*, 67(2), 97–112. <https://doi.org/10.1080/07448481.2018.1462822>
- Weinstein, A., & Lejoyeux, M. (2010). Internet Addiction or Excessive Internet Use. *American Journal of Drug & Alcohol Abuse*, 36(5), 277–283. Retrieved from <https://doi.org/10.3109/00952990.2010.491880>
- World Health Organization. (2015). Public health implications of excessive use of the internet, computers, smartphones and similar electronic devices: meeting report. *Main Meeting Hall, Foundation for Promotion of Cancer Research*, National Cancer Research Centre, Tokyo, Japan, 27–29 August 2014. World Health Organization, 2015 [E-Reader Version]. Retrieved from <https://apps.who.int/iris/handle/10665/184264>
- Yamada, T., Moshier, S. J., & Otto, M. W. (2016). No site unseen: predicting the failure to control problematic Internet use among young adults. *Cognitive Behaviour Therapy*, 45(6), 496–500. <https://doi.org/10.1080/16506073.2016.1205657>
- Younes, F., Halawi, G., Jabbour, H., El Osta, N., Karam, L., Hajj, A., & Rabbaa Khabbaz, L. (2016). Internet Addiction and Relationships with Insomnia, Anxiety, Depression, Stress and Self-Esteem in University Students: A Cross-Sectional Designed Study. *PloS One*, 11(9), e0161126. <https://doi.org/10.1371/journal.pone.0161126>
- You F, Lin J. (2006). College students' mental health status investigation and result analysis. *Journal of Hunan Institute of Technology*, 27(10), 234–236.
- Young, K. S. (1996). Internet addiction: The emergence of a new clinical disorder. *104th annual meeting of the American Psychological Association*. Toronto, Canada.

Acknowledgements

The study is dedicated to the following research project: internal grant of Palacký University Olomouc IGA_PdF_2021_00 named The Incidence of Problematic Use of the Internet in Relation to Mental Health and Life Satisfaction Among Students of Teacher Training Programs.

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