

Depression and Anxiety: Relationships with Internet Addiction in Palestine

FAYEZ AZEZ MAHAMID¹, DENISE ZIYA BERTE²

¹Psychology and Counseling Department
An-Najah National University,
Nablus,
Palestine

²Nationalities Service Center,
Philadelphia,
USA

For Correspondance:
Dr. Fayez Azez Mahamid
An-Najah National University
Email: mahamid@najah.edu

Abstract

Objective: Internet addiction (IA) has been positively identified in Palestinian university students, with rates far above students of similar ages in other countries and settings (Mahamid & Berte, 2018). Despite this consistent finding, the psychological mechanism behind IA in this unique population is unclear. This study was initiated to provide a more in-depth analysis of the relationship between symptoms of depression, anxiety and excessive addictive internet use patterns. **Method:** The study included a sample of 544 university students from An-Najah National University (ANNU) in Nablus, Palestine, reflecting a normalized cross section of the population. Measures of excessive and addictive patterns of use were measured by the Internet Addiction Scale (Young, 2012), while symptoms of anxiety were evaluated by the Taylor Manifest Anxiety Scale (Taylor, 1953). Depressive symptoms were assessed using the Beck Depression Scale (Beck, 1996). **Results:** Findings revealed that, in general, excessive and addictive patterns of internet use were prevalent among the population, with the majority of subjects reaching indicative of Internet addiction. Anxiety was also found to be of concern throughout the population, while depression was less significant. The relationship between the variables of addictive Internet use, depression, and anxiety were found to be significantly correlated. **Conclusion:** The results of this study assist in identifying and analyzing the relationships between mental health symptomology and addictive behaviors, specifically Internet addiction in high stress living environments where other addictive outlets (alcohol, illegal substances, gambling, and sexual promiscuity, etc.) may be unavailable. Further work that attempts to understand the chronological development of these behaviors and symptoms of Internet addiction will enable professionals to determine the causal or trajectory relationships between anxiety, depression, and Internet use.

Keywords: Internet Addiction, Depression, Anxiety, Palestine

القلق والإكتئاب وعلاقتها بإدمان الإنترنت في فلسطين

هدفت الدراسة إلى التعرف على القلق والإكتئاب وعلاقتها بإدمان الإنترنت لدى الطلبة الجامعيين في فلسطين، تكونت عينة الدراسة من 544 طالباً وطالبة من الطلبة المسجلين في جامعة النجاح الوطنية، اختيروا باستخدام الطريقة العشوائية البسيطة، وقد استخدمت الدراسة الحالية مقياس يونغ (يونغ، 2012) لفحص مستوى الإدمان، كما استخدمت مقياس تايلور (تايلور، 1953) لفحص درجة القلق، وقائمة بيك (بيك، 1996) للتعرف على مستوى الإكتئاب لدى الطلبة الجامعيين. أظهرت نتائج الدراسة وجود علاقة ارتباطية موجبة دالة إحصائياً بين كل القلق وإدمان الإنترنت ($r = 0.23^{**}$, $p < 0.01$)، ووجود علاقة ارتباطية موجبة بين الإكتئاب وإدمان الإنترنت ($r = 0.16^{**}$, $p < 0.01$)، ولم تظهر النتائج فروقاً ذات دلالة إحصائية مستوى الإكتئاب، والقلق، وإدمان الإنترنت تبعاً لمتغيرات الجنس، والتخصص، والمستوى الأكاديمي، ومكان السكن.

تظهر نتائج الدراسة الحالية طبيعة العلاقة بين بعض مظاهر الصحة النفسية والإدمان، وبخاصة إدمان الإنترنت في حالات الإجهاد والضغط النفسي المرتفع، لذا فإن إجراء مزيد من الدراسات التي تستهدف فحص العلاقة التفاعلية بين متغيرات الدراسة ومتغيرات أخرى مرتبطة، سيمكن المهنيين من تحديد ودراسة العلاقات السببية بين القلق والإكتئاب واستخدام الإنترنت.

Submitted: October 2, 2019 Revised: April 21, 2020

Accepted: September 22, 2020

Introduction

Digital addiction is defined by the American Society for Addiction Medicine (ASAM) as well as the American Psychiatric Association (APA) as a “primary chronic disease of brain reward, motivation, memory and related circuitry. Dysfunction in these circuits leads to characteristic biological, psychological, social and spiritual manifestations” (Peper & Harvey, 2018, P. 3). These biological realities are reflected in an individual’s repetitive, non-productive, and change resistant behavior patterns, despite their negative consequences (APA, 2013; ASAM, 2016).

In the case of Internet Addiction, symptoms can include significant non-productive loss of time, an inability to complete everyday academic, vocational, and domestic tasks, social isolation, loss of income, decreased physical activity, insomnia, feelings of distress when unable to connect to the internet, and physical pain and dysfunction such as carpal tunnel syndrome, muscular pain, etc. While it has long been hypothesized that there are psychological effects associated with Internet Addiction, including increased symptoms of anxiety and depression, the literature has been somewhat inconsistent in demonstrating stable findings in this area (Akin & Iskender, 2011; Dalbudak et al., 2016; Lee, Lee, et al., 2001; Yen et al., 2014).

Peper & Harvey (2018) reported that, in a study of adults, the group of highest-using internet consumers demonstrated decreased social interaction, increased perceptions of social isolation, and self-reported feelings of loneliness, depression, and anxiety. Mehroof & Griffith (2010) looked at both general personality characteristics and time-limited emotional experiences. They found that symptoms of neuroticism, sensation seeking, and anxiety as general behavioral/cognitive and emotional personal structures, and being frequently in an anxious state, were related to participants’ Internet Addiction. Lin et al., (2016) reported that higher levels of general internet use correlated with higher levels of self-reported depression in adults. As the use of technology increases and diversifies, the study of Internet Addiction is forced to look at more complex models to understand internet and social media use, including systems that codify different functions of an individual’s digital activity with corresponding varied

effects on their psychological/emotional status (Rikkers et al., 2016).

A variety of models have been proposed to explain the mechanisms that may initially cause addictive patterns of use, alongside those that maintain those behaviours over time and throughout personal negative impact. Bandura (2001), using social learning theory, defines Internet Addiction as a challenge with self-regulation that may affect all media consumers, including those whose media consumption patterns are generally considered normal. In this model, “symptoms” of addiction are defined as indicators of deficient self-regulation that are found at differing levels among the general population (Eastin et al., 2003).

Cognitive-behavioral models of pathological internet use (PIU) focus on the maladaptive cognitions in individuals that lead to addictive patterns of use. Individuals with PIU may believe they are incapable of forming a relationship or attaining a career, leading them to search for success in a virtual world which is less complicated, unilateral, and provides immediate and continual feedback. The initial cognitions are the primary and basic cause of Internet addiction, and if not addressed can lead to further and/or diversified addictive behaviors (Davis, 2001).

Elhai et al. (2016) distinguished Process-Oriented internet use (including entertainment, information seeking, shopping, etc.) from Socially-Oriented activities (such as messaging, social media, etc.) and tested the differing psychological effects of each. The study found that anxiety was more common in individuals engaging in excessive process-oriented digital tasks, and depression was lower for individuals using the internet for socially-oriented tasks. Individuals with some level of depression may then find social uses of the internet (e.g. remaining connected to social supports, making social plans, etc.) to be helpful in mitigating their symptoms.

These findings demonstrate that while there are notable psychological effects of Internet Addiction, they are mediated by the purpose of internet use and how its functionality aligns with the practical and psychological needs of the individual. There is a difference between mere excessive use of the internet and addictive patterns of use which are identified

through social isolation and decreased productivity (Gamito et al., 2016).

Multi-tasking, which is the inclination to simultaneously engage in more than one activity, has been found to interrupt attention and decrease performance in most situations (Grinols & Rajesh, 2014; Lim & Shim, 2016). Digital applications, however, are designed to promote and facilitate multi-tasking as a desired outcome. Becker et al. (2013) coined the phrase “semi-tasking” to describe the split attentional and motivational state of individuals attempting to complete multiple tasks at the same time while using digital devices. These tasks may include non-media tasks (e.g. walking the dog while texting), cross media tasks (e.g. watching a TV program while answering e-mails) or multi-media tasks performed on a single device (e.g. talking on the phone while searching for a restaurant). Becker et al. (2013) found that there was a significant increase in depression and social anxiety related to the time spent digitally semi-tasking in adults. This indicates that the push to “be everywhere and do everything” promoted by the technological world may lead to a continual feeling of underperforming in all areas. The psychological effects of multi-tasking, including symptoms of anxiety, may be over and above the effects of simple excessive internet use.

Developmental considerations become critical when discussing Internet Addiction, as the harmful effects of excessive internet use may differ in harm depending on biological, cognitive, and psychological factors that are directly related to maturity and life-experience. This is important when looking at use of the internet over the lifespan (Stavropoulos et al., 2018).

Vannucci et al. (2016) addressed this issue in the population they termed “emerging adults”, many of whom are university aged students. They demonstrated that within this vulnerable group, excessive levels of internet use in general were related to higher levels of non-clinical anxiety. Furthermore, excessive, daily use was linked to clinical levels of anxiety-related symptoms, leading to actual diagnoses of generalized anxiety disorder. This demonstrates the chronological aspects of addictive behaviors (i.e. how it evolves over time and its relation to frequency of use), and encourage interventions to avoid more

serious psychological effects of excessive or addictive internet activities.

Several studies tested the relationship between Internet Addiction, anxiety, and depression. For example, Dalbudak et al. (2013) revealed that Internet Addiction was positively correlated with anxiety and depression among university students, whereas it was negatively correlated with self-regulation. Ko et al.'s (2014) study showed that a non-addicted group exhibited decreased depression, hostility, and social anxiety more than a persistently-addicted group. Lee, Oh et al. (2001) revealed that adolescents with Internet Addiction experienced higher levels of depression, which was correlated with a more sensitive response towards negative feedback and more problems within peer relationships, compared with adolescents without internet addiction. Finally, Ahmadi et al. (2014) showed that addiction to the Internet, computer games, DVDs, and videos were positively correlated to anxiety and depression in high school students in Iran.

Programs educating parents and young adults about the addictive Internet engagement and possible negative outcomes, as well as compelling the technology industry to design products with properties that decrease addiction should be part of Psychoeducational programs. Increased regulation of Internet use depending on age and self-awareness may also be an option when protecting adolescents from Internet Addiction (Orsal et al., 2013).

The current study focuses on a group of “emerging adults” (university students) within occupied Palestine, evaluating excessive Internet use, Internet Addiction, and levels of anxiety and depression related to patterns of Internet usage.

Previous work (Berte et al., 2019; Mahamid & Berte, 2018a, 2018b) has demonstrated high levels of excessive Internet use and Internet Addiction among the Palestinian university student population. The Internet is generally accessible to university students and not well monitored by parents, allowing for continual use and digital interaction. Despite the benefits that technology brings to this otherwise marginalized population, it is not without risk of negative consequences.

The current study examines the relationship between Internet Addiction, anxiety, and depression by measuring general levels of these symptoms in the observed population, to determine what percent of Internet Addiction can be predicted by levels of anxiety and depression found among Palestinian university students.

Research Questions

This study was designed to answer the following questions:

1. What is the degree of Internet Addiction, depression, and anxiety in Palestinian university students?
2. Are there significant correlations between Internet Addiction, depression, and anxiety among university students?

Methodology

Participants

Participants were selected using a simple random sampling technique of An-Najah National University (ANNU) students through compulsory course class lists, using every 7th student to solicit for study purposes. 544 students participated: 134 males and 410 females. 53.3 percent of participants were from cities, 43 percent from villages, and 3.7 percent from camps; 91.2 percent were undergraduate students, and the remainder were graduate students; 80.5 percent studied humanities and roughly 19.5 percent studied subjects in the sciences. The population was selected from those who agreed to answer the questionnaire. The sample consisted of approximately 5% of current ANNU students; 600 questionnaires were distributed and 544 were completed and analyzed. The study was submitted for review by the An-Najah Institutional Review Board (IRB) and received approval before data collection was initiated.

Data Collection

The Internet Addiction Test (IAT), created by Kimberly Young (2012), was used to measure the level of addictive Internet behaviors. It consists of 20 items that measure mild, moderate, and severe levels of Internet Addiction. Examinees responded to each statement with a number from 1 to 5 on a Likert scale continuum, indicating the extent to which they engage in a particular behavior. The IAT views Internet

Addiction as an impulse-control disorder, where the term "Internet" refers to all types of online activity. Mahamid and Berte (2018) validated the scale in a Palestinian context by using construct and content validity; the scale ended with 19 items to test Internet Addiction, and Cronbach's alpha coefficients also indicated high internal consistency for the total scale (0.87).

The scale includes information on demographics, Internet usage, and perceived negative effects of Internet use on personal performance. The scale also measures Internet use according to the following criteria:

1. Controlled Use (20 – 49 points): Average on-line use; may include periods of excessive Internet use, but use is generally within expected quantity and without negative social, vocational, economic, or academic consequences.
2. Occasional to Frequent Problem Use (50- 79 points): Occasional negative impact of Internet use or frequent excessive use without impact.
3. Significant Problematic Use (80 – 100 points): Internet use causing significant problems or life challenges, including distress when unable to use and continued use despite negative impact.

Taylor's Manifest Anxiety Scale (TMAS), developed in 1953, was used to measure levels of anxiety. It consists of 50 items with true-false responses for each item; and the replies that indicate anxiety are counted and given a score from 0 to 50, with a higher score representing a higher level of anxiety. A committee of 10 psychology experts reviewed the items of the scale for content validity and comprehensiveness. The researchers used a score of 80% agreement between experts for the inclusion of each item. Accordingly, minor modifications were made on the basis of feedback from committee members. In order to test reliability of the scale, Cronbach's alpha formula was used among a sample of 50 university students independent of the study sample (reliability sample); Cronbach's alpha coefficients indicated a high level of reliability for the total scale (0.80).

The Beck Depression Inventory-II (BDI-II), developed in 1996, is the most widely used psychological instrument for measuring symptoms of depression. This version of the inventory consists of 21 items, in which four response options are presented on a scale from 0 to 3. For example, to measure pessimism (item 2), the response options used range from “I am not particularly discouraged about the future” (score of 0) to “the future is hopeless and things cannot improve” (score of 3). A committee of 10 psychology experts reviewed the items on the scale for content validity and comprehensiveness. The researchers used a score of 80% agreement between experts for the inclusion of each item. Accordingly, minor modifications were made on the basis of feedback from committee members. In order to test reliability of the scale, Cronbach’s alpha formula was used among a sample of 50 university students independent of the study sample (reliability sample); Cronbach’s alpha coefficients indicated a high level of reliability for the total scale (0.90).

Research Procedures

The research was conducted in 2019 and lasted five months. After obtaining ethical approval, one of the authors visited students in classes and explained the aims of the research. Participation was strictly voluntary, with no monetary or other incentives provided. Those who agreed to participate provided written consent. In keeping with the study’s cross-sectional quantitative design, all participants were asked to complete self-report questionnaires. Data collection was anonymous, and all analyses were performed on aggregate scores.

Statistical analysis

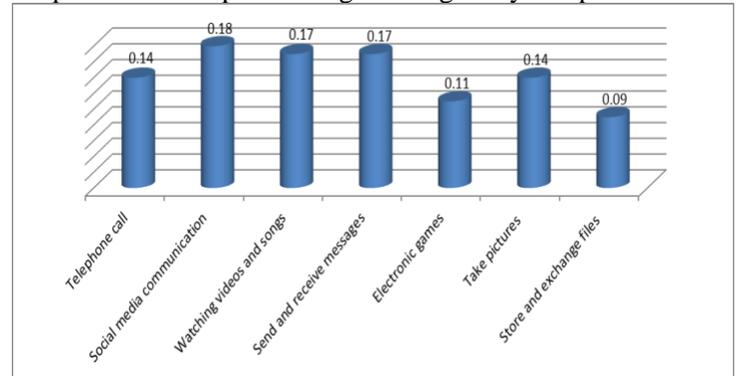
Means, standard deviations, and percentages were used to test the degree of Internet Addiction, anxiety and depression in university students. Pearson’s Correlation Coefficient was also conducted to test the relationship between Internet Addiction, anxiety, and depression among participants, and a regression analysis was performed to test a possible causal relationship.

Results

Participants reported that they use their smartphones for many purposes. When asked about the activities for which they use their mobile device, roughly 18% of respondents’ scores were for social media

communication, 17% for watching/listening to videos and songs, 17% for sending and receiving messages, 14% for making telephone calls, 14% for taking pictures, 11% for electronic game playing, and 9% for storing and exchanging files.

Figure 1
Purposes of smartphone usage among study sample



To test levels of Internet Addiction, anxiety, and depression among An-Najah National University students, means and standard deviations were calculated as shown in Table 1.

Table 1

Means and standard deviations for research variables (N=544)

Variable	Mean	S.D	Min	Max
Internet addiction	45.98	17.65	6	100
Anxiety	25.15	5.70	10	50
Depression	19.97	13.86	0.0	56

As Table 1 indicates, students scored mild levels of Internet Addiction, with above moderate scores for anxiety and medium scores for depression.

To answer whether there are any significant correlations between Internet Addiction, anxiety, and depression among An-Najah National University students, Pearson's Correlation Coefficient was calculated as shown in Table 2.

Table 2
Intercorrelations for study variables (N=544)

Measures	(1)	(2)	(3)
(1) Internet addiction	-	.23**	.16**
(2) Anxiety		-	.36**
(3) Depression			-

**p < 0.01

As shown in Table 2, Internet Addiction was positively correlated with both anxiety ($r = .23^{**}$, $p < 0.01$) and depression ($r = .16^{**}$, $p < 0.01$). Anxiety was also positively correlated with depression ($r = .36^{**}$, $p < 0.01$).

The regression analysis for predicting Internet Addiction was conducted as shown in Table 3.

Table 3
Regression to predict internet addiction (N=544)

Variable	B	SE	β	t	p	95% CL
Depression	.10	.05	.08*	1.923	.04*	[-.002 - .22]
Anxiety	.64	.13	.20**	4.678	.000*	[.37 - .91]
Gender	2.56	1.72	.06	1.482	.13	[-.83 - 5.96]
Faculty	-3.17	1.92	-.07	-1.651	.09	[-6.95 - .60]
Academic level	-3.81	2.68	-.06	-1.423	.15	[-9.09 - 1.45]
Residence	-1.25	1.29	-.04	-.969	.33	[-3.79 - 1.28]

*p < 0.05, **p < 0.01

Results of table 3 indicate that anxiety contributed in a way that was statistically significant towards explaining variance in Internet Addiction ($B = .64$, $SE = .13$, $\beta = .20$), as did depression ($B = .10$, $SE = .05$, $\beta = .08$).

Discussion

The current study demonstrated that in a population of Palestinian university students, levels of Internet Addiction and symptoms of anxiety were above those

of university students in other countries, but at roughly the expected rate within Palestine, as per previous findings (Berte et al., 2019; Mahamid & Berte, 2018a, 2018b). However, it was found that, in general, levels of symptoms for depression were not high for participants included in the current study.

The study determined there was a positive, linear relationship between levels of Internet Addiction and anxiety (with higher levels of Internet use related to higher levels of anxiety), as found in previous research. However, the data also represented a curved relationship between levels of Internet Addiction and depression, with higher levels of use related to increased levels of depression.

Lastly, it was determined that while anxiety accounted for approximately 20% of variance in the factor of participants with Internet Addiction, depression accounted for only 8% of variance, and was statistically significant.

There are some limitations to the findings within the context of this study. Firstly, the use of a limited population of university students, who may engage in excessive Internet use related to their studies and living away from home (generally for the first time), may not represent other young adults who are working, married, or living with their families of origin, whose use of the Internet may differ in severity and type.

In addition, only self-report measures were used for all factors which may affect the results, due to a desire for positive self-presentation, an inability to understand the questions, or an inability to remember actual rates of use or experience of symptoms. This may be especially true, as Palestinian populations have been previously found to use avoidance as their preferred coping skill to manage negative thoughts and feelings (Mahamid & Berte, 2018b).

Finally, varying types of Internet use characteristics (e.g. process-oriented, social-oriented, multitasking, etc.) were not distinguished in the study, which would allow for the evaluation of differing effects of functional vs. non-productive use on psychological symptoms.

Park and Kim (2015) discuss in detail the neurological basis for Internet Addiction. This includes both the evolutionary sensibilities around danger notification (such as the push notifications used by many Internet applications) leading to Central Nervous System (CNS) activation, as well as the intermittent stimulation activation rate of reward centers in the brain; when positive social feedback is received via social media, which is higher than any normally-occurring feedback in the natural world. This activation of the CNS (the biological basis of perceived symptoms or psychological experiences of anxiety) may be related to the higher levels of anxiety exhibited in the participants of the current study. Kouider (2015) looks specifically at the issue of digital notifications, which, like all environmental information, are scanned for risks by the human nervous system, but are created specifically to resemble an alert of danger that immediately engages the central nervous system and leads to arousal of the individual. It is likely that individuals with higher rates of use would show higher levels of arousal, which may also be interpreted as anxiety at an interpersonal level, as seen throughout our study.

According to Peper (2015), having multiple competing inputs for an individual's attention leads to an evolutionary trap, where in a highly stimulated state, the organism must determine what stimuli deserves focus, and in what order, which takes energy and time from the actual response. This would be most evident in those with higher and more consistent use (such as those individuals in the study scoring within the category of Internet Addiction). Continual vigilance and attention distraction may lead to irritability, an inability to concentrate, and diffusion of energy and focus. These symptoms would be most related to the emotional experience of anxiety, as found in this study. Lee, Kwon, and Kim (2016) explain further that the activation of neurological reward and motivation centers lead to the release of pleasurable endorphins, like a drug, and enhance the addictive properties of the activity: in this case, Internet engagement. The rate and frequency of activation related to Internet/ social media feedback is much higher than in normal social situations, and may diminish the biological value of regular social interactions, which in turn may increase an individual's use of the Internet for socialization and their propensity for addiction (Love et al., 2015).

The effect of this neurological process is not only biological, but behavioral, social, cognitive, and psychological as well. Swingle (2016) found lower levels of social connectivity, emotional regulation, and self-initiation, as well as an increase in social isolation and frequency of Attention Deficit with Hyperactivity (ADHD) diagnoses in individuals with increased and problematic Internet usage. In young adult subjects, these characteristics might also be labeled as anxiety, as demonstrated in the current study. These findings demonstrate the academic, vocational, social, psychological, and behavioral consequences of Internet Addiction within vulnerable populations: in this case, emerging adults.

The question is how parents, universities, and the community at large will support in preventing Internet Addiction within these vulnerable, developing populations, while technology companies continue to benefit from creating instruments designed to increase their addictive potential.

Schulson (2015) suggests that individuals, despite education, positive mental health, and appropriate social support systems, will continue to struggle with Internet Addiction, due to the inherent addictive nature of technology itself. Schulson (2015) proposes external regulation and monitoring of Internet products and companies, linking Internet Addiction to a public health crisis, especially for vulnerable populations such as children and youth. The anxiety levels noted in this study is only one of many negative impacts of Internet Addiction found in at-risk youth.

Technological advances in Internet and digital equipment use and efficiency will be an ongoing issue in society moving forward. Understanding the mechanisms of use and addiction, as well as its effects on development, cognition, emotion, and behavior, will be critical in maximizing its benefits while protecting our communities from the risks of technology. For "emerging adults" who are at a critical period in their development of lifelong habits, it is particularly important that we continue to examine Internet use, Internet addiction, and mental health risk for today's generations and the generations to come.

Conclusion

The current study supported previous findings demonstrating that Internet Addiction was significantly and positively correlated with depression and anxiety. While it is clear that Internet Addiction can be predicted by anxiety and depression among university students in a geo-politically affected environment such as Palestine. Further studies are recommended to test the relationship between current study variables and other related variables that may explain variance in Internet Addiction among university students. It also recommends implementing therapeutic interventions to reduce anxiety, depression and Internet addictive symptoms among university students.

Ethical Approval

All procedures performed in this study involving human participants were in accordance with the ethical standards of University's Research Ethics Board, the American Psychological Association (APA, 2010) and with the 2013 Helsinki Declaration.

Informed Consent

Informed consent was obtained from all participants.

Compliance with Ethical Standards

Conflict of Interest

The authors declare that they have no conflict of interest. No funding was received for this study.

References

Ahmadi, J., Amiri, A., Ghanizadeh, A., Khademalhosseini, M., Khademalhosseini, Z., Gholami, Z., & Sharifian, M. (2014). Prevalence of addiction to the internet, computer games, DVD, and video and its relationship to anxiety and depression in a sample of Iranian high school students. *Iranian Journal of Psychiatry and Behavioral Sciences*, 8(2), 75.

Akin, A., & Iskender, M. (2011). Internet addiction and depression, anxiety and stress. *International Online Journal of Educational Sciences*, 3(1), 138-148.

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. American Psychiatric Pub.

American Society of Addiction Medicine. (2016). *Public policy statement: Definition of Addiction*. <https://www.asam.org/Quality-Science/definition-of-addiction>.

Bandura, A. (2001). Social cognitive theory: An argentic perspective. *Annual Review of Psychology*, 52, 1–26. <https://doi.org/10.1146/annurev.psych.52.1.1>

Beck, A. T., Steer, R. A., & Brown, G. K. (1996). *Manual for the Beck Depression Inventory-II*. Psychological Corporation.

Becker, M.W., Alzahabi, R., & Hopwood, C. J. (2013). Media multitasking is associated with symptoms of depression and social anxiety. *Cyberpsychology, Behavior and Social Networking*, 16(2),132-135 . <https://doi.org/10.1089/cyber.2012.0291>

Berte, D. Z., Mahamid, F. A., & Affouneh, S. (2019). Internet addiction and perceived self-efficacy among university students. *International Journal of Mental Health and Addiction*. doi:10.1007/s11469-019-00160-8.

Dalbudak, E., Evren, C., Aldemir, S., Coskun, K. S., Ugurlu, H., & Yildirim, F. G. (2013). Relationship of internet addiction severity with depression, anxiety, and alexithymia, temperament and character in university students. *Cyberpsychology, Behavior and Social Networking*, 16(4), 272-278.

Davis, R. (2001). A cognitive-behavioral model of pathological internet use. *Computers in Human Behavior*, 17, 187-195. [https://doi.org/10.1016/S0747-5632\(00\)00041-8](https://doi.org/10.1016/S0747-5632(00)00041-8)

Elhai, J. D., Levine, J.C., Dvorak, R.D., & Hall, B. J. (2017). Non-social features of smartphone use are most related to depression, anxiety and problematic smartphone use. *Computers in Human Behavior*, 69, 75-82. <https://doi.org/10.1016/j.chb.2016.12.023>.

- Eastin, M., Lin, C., & Robert, L. (2003). Unregulated internet usage: Addiction, habit, or deficient self-regulation? *Media Psychology*, 5(3), 225–253. https://doi.org/10.1207/S1532785XMEP0503_01
- Gamito, P. S., Morais, D. G., Oliveira, J. G., Brito, R., Rosa, P. J., & de Matos, M. G. (2016). Frequency is not enough: Patterns of use associated with risk of Internet addiction in Portuguese adolescents. *Computers in Human Behavior*, 58, 471-478.
- Grinols, A. B., & Rajesh, R. (2014). Multitasking with smartphones in the college classroom. *Business and Professional Communication Quarterly*, 77(1), 89-95. [dx.doi.org/10.1177/2329490613515300](https://doi.org/10.1177/2329490613515300).
- Ko, C. H., Liu, T. L., Wang, P. W., Chen, C. S., Yen, C. F., & Yen, J. Y. (2014). The exacerbation of depression, hostility, and social anxiety in the course of Internet addiction among adolescents: A prospective study. *Comprehensive Psychiatry*, 55(6), 1377–1384. doi:10.1016/j.comppsy.2014.05.00
- Kouider, S., Long, B., Le Stanc, L., Charron, S., Fievet, A.C., Barbosa, L.S. & Gelskov, S.V. (2015) Neural dynamics of prediction and surprise in infants. *Nature Communications*, 6(2), 1-8 . doi.org/10.1038/ncomms9537
- Lee, J., Kwon, J., & Kim, H. (2016, September). Reducing distraction of smartwatch users with deep learning. In *Proceedings of the 18th International Conference on Human-Computer Interaction with Mobile Devices and Services Adjunct* (pp. 948-953).
- Lee, S. B., Lee, K. K., Paik, K. C., Kim, H. W., & Shin, S. K. (2001). Relationship between internet addiction and anxiety, depression, and self efficacy in middle and high school students. *Journal of Korean Neuropsychiatric Association*, 40(6), 1174.
- Lee, M. S., Oh, E. Y., Cho, S. M., Hong, M. J., & Moon, J. S. (2001). An assessment of adolescent Internet addiction problems related to depression, social anxiety and peer relationship. *Journal of Korean Neuropsychiatric Association*, 40(4), 616-628.
- Lim, S. & Shim, H. (2016). Who multitasks on smartphones? Smartphone multitaskers' motivations and personality traits. *Cyberpsychology, Behavior and Social Networking*, 19(3), 223-227. doi.org/10.1089/cyber.2015.0225
- Lin, L.Y., Sidani, J.E., Shensa, A. & Radovic, A. (2016). Association between social media use and depression among U.S. young adults. *Depression and Anxiety*, 33(4),323-331. doi.org/10.1002/da.22466
- Love, T., Laier, C., Brand, M., Hatch, I., & Hajela, R. (2015). Neuroscience of internet pornography addiction: A review and update. *Behavioral Sciences*, 5(3), 388-433. [dx.doi.org/10.3390/bs5030388](https://doi.org/10.3390/bs5030388)
- Mahamid, F. A., & Berte, D. Z. (2018a). Social media addiction in geopolitically at-risk youth. *International Journal of Mental Health and Addiction*, 17(1), 102–111. doi.org/10.1007/s11469-017-9870-8.
- Mahamid, F. A., & Berte, D. Z. (2018b). Portrayals of violence and at-risk populations: Symptoms of trauma in adolescents with high utilization of social media. *International Journal of Mental Health and Addiction*. doi.org/10.1007/s11469-018-9999-0.
- Mehroof, M., Griffiths, M.D. (2010). Online gaming addiction: The role of sensation seeking, self-control, neuroticism, aggression, state anxiety, and trait anxiety. *Cyberpsychology, Behavior and Social Networking*, 13(3),313-316 . <https://doi.org/10.1089/cyber.2009.0229>
- Orsal, O., Orsal, O., Unsal, A., & Ozalp, S. S. (2013). Evaluation of internet addiction and depression among university students. *Procedia-Social and Behavioral Sciences*, 82, 445-454. [doi:10.1016/j.sbspro.2013.06.291](https://doi.org/10.1016/j.sbspro.2013.06.291)
- Park, H. S. & Kim, S. E. (2015). Internet addiction and PET. In C. Montag & M. Reuter (Eds.), *Internet Addiction: Studies in Neuroscience, Psychology and Behavioral Economics* (pp. 65-76). Springer International Publishing. doi.org/10.1007/978-3-319-07242-5_4

Peper, E. & Harvey, R. (2018). Digital addiction: Increased loneliness, anxiety and depression. *NeuroRegulation*, 5(1), 3-8. doi.org/10.15540/nr.5.1.3

Peper, E. (2015). Evolutionary/ecological traps create illness: Be aware of commercialized stimuli. *Psychophysiology Today, The Mind Body Magazine*, 10(1), 9-11.

Rikkers, W., Lawrence, D., Hafekost, J., & Zubrick, S. R. (2016). Internet use and electronic gaming by children and adolescents with emotional and behavioural problems in Australia – results from the second Child and Adolescent Survey of Mental Health and Wellbeing. *BMC Public Health*, 16(1), 399.

Schulson, M. (2015, November 24). *User behaviour: Websites and apps are designed for compulsion, even addiction. Should the net be regulated like drugs or casinos?* <https://aeon.co/essays/if-the-internet-is-addictive-why-don-t-we-regulate-it>

Stavropoulos, V., Griffiths, M. D., Burleigh, T. L., Kuss, D. J., Doh, Y. Y., & Gomez, R. (2018). Flow on the Internet: A longitudinal study of Internet addiction symptoms during adolescence. *Behaviour & Information Technology*, 37(2), 159-172.

Swingle, M. K. (2016). *I-Minds: How cell phones, computers, gaming and social media are changing our minds, our behavior, and the evolution of our species*. New Society Publishers.

Taylor, J. (1953). A Personality Scale of Manifest Anxiety. *Abnormal and Social Psych*, 48(2), 285-290.

Vannucci, A., Flannery, K. M., & Ohannessian, C. M. (2016). Social media use and anxiety in emerging adults. *Journal of Affective Disorders*, 207(1), 163-166. doi.org/10.1016/j.jad.2016.08.040

Velez-moro, R., Lacefield, K., & Roberti, J. W. (2010). Perceived stress, sensation seeking, and college students' abuse of the Internet. *Computers in Human Behavior*, 26(6), 1526–1530. doi:10.1016/j.chb.2010.05.020