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Associating Time Devoted to Online Gaming with Subjective Well-being, Emotional States and Affective Schedules

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ABSTRACT

Online gaming is one of the most popular students' activities associated with various aspects of their experience and behavior. This paper aims to investigate the frequency of online gaming among students and determine the association among the frequency of online gaming, emotional states, and affective schedules. The sample included 1000 undergraduate and graduate students at the University of Zagreb, studying in different science fields. The average age of the respondents was 23. The self-evaluation of time that students devote to online gaming was conducted in accordance with time categories expressed in hours devoted to online gaming. The subjective well-being was based on the self-assessment of life satisfaction questionnaire, the assessment of the frequency and intensity of unpleasant emotional state on DASS-21 questionnaire and a measure of the assessment of positive and negative affect on PANAS (Positive-PA and Negative-NA affective Schedule. The results confirm that students who are excessively involved in online gaming are less satisfied with their lives, assess unpleasant affective experience more intensively and pleasant affective experience less, compared to students who are less frequently involved in online gaming. Female students assess unpleasant emotional states of anxiety, depression, and stress more intensively than male students. Furthermore, female students assess unpleasant and pleasant affective experience more intensively than male students. These results can be applied to provide suggestions on what optimum time devoted to online gaming compared to other activities would be.

Keywords: affect, life satisfaction, online gaming

1. Introduction

Online gaming is an increasingly popular form of entertainment, and it is related to subjective well-being, emotional states, affective schedule, and problems caused by higher frequency and longer periods of online gaming.

The time devoted to online gaming corresponds to the development of excessive gaming and problematic behavior. The higher the frequency and duration of the game, the higher the level of problematic behavior which may lead to pathological gaming [1]. Kuss et al. [2] 2013 provided research results from different countries, according to which the prevalence rate of internet addiction among students ranges from 13% to 18,4%, and in general population between 6% and 15%. Problematic and pathological gaming around the world today shows an upward curve. For example, players excessively involved in online gaming spend over 40 hours per week playing online games, which equates to full-time work or more [3]. In the USA, 91% of

children aged 12 to 17 practice online gaming. Furthermore, of the 318 million online gamers in the USA, at least 5 million meet the Internet Gaming Disorder criteria *(*IGD, which consequently results in personal, health, social and other issues [4], according to [5]. In 2013, Internet Gaming Disorder (IGD) was included in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5*)* by the American Psychiatric Association (APA)[6]. In 2018, World Health Organization (WHO) introduced the term 'Internet Gaming Disorder' in the International Statistical Classification of Diseases, Injuries and Causes of Death [7]. In her research, Bilić [8] states that 80.6% of children in Croatia practice online gaming. Research results, however, show that it does have both positive and negative effects.

1.1. Theoretical background

Internet Gaming Disorder (IGD) is defined by the following diagnostic criteria: preoccupation, withdrawal, tolerance, loss of control, giving up other activities, continuation, deception, escaping and negative consequences (DSM-5*)*. Mihara and Higuchi [9] 2017 conducted a research aimed at finding and systemic unification of cross-sectional studies on prevalence and longitudinal epidemiological investigations of Internet Gaming Disorder (IGD). IGD prevalence ranged from 0.7% to 27.5% in the entire sample; in the majority of studies, it was higher in men then in women and was also higher in younger population compared to the elderly. The results of cross-sectional research show that Internet Gaming Disorder (IGD) is associated with higher frequency and longer periods of online gaming [9]. In addition to gaming, IGD associated factors considered by cross-sectional studies also included family and human relations, social and school functioning, success in education and general physical and mental health. Recent studies have provided strong evidence supporting the association of internet gaming disorder (IGD) with various physical and mental health challenges. These include sleep deprivation, poor sleep quality, skipping meals, unhealthy eating habits, reduced immunity, obesity, and musculoskeletal issues such as poor posture and deformities. Additionally, excessive gaming has been linked to negative psychological and social outcomes, including dissatisfaction, functional difficulties in daily life, and disruptions in family and social relationships [10], [11], [12], [13], [14], [15].

The predictors associated with excessive gaming refer to gender, time devoted to gaming [16], [17]; and motivation. Motivation is considered an important risk factor associated with the development of problematic and pathological gaming pattern [16]. Research results show that differences in online gaming between men and women have decreased and these groups of players have become almost equal [9], whilst earlier studies showed that men were associated with higher IGD prevalence ([18], [19]; King et al., 2013 according to [9]).

Apart from the negative effects of online gaming, there are also some positive ones. Contrary to conventional beliefs that gaming leads to intellectual poverty, certain research emphasize that gaming enforces a wide range of cognitive abilities. This particularly applies to action games which encourage fast processing of information and require swift decision making, precision and concentration on the given task as well as better spatial orientation [20]). Online games are modified and updated, become more and more complex, diversified, realistic, providing appealing social, cognitive and emotional experience to players [21]. When playing, online gamers develop their logical reasoning skills [4]. Wai et al. [21] state that online games contribute to the development of spatial orientation and abilities important for achieving success in Science, Technology, Engineering and Mathematics (STEM). Bavelier et al. [22] confirm that online gamers filter irrelevant information more efficiently, develop visualization skills in 3D navigational space and develop skills of fast decision-making and attentive monitoring of sudden events in the environment. Research [4] show that, additionally to spatial skills, online games are a good means of developing problem-solving skills, practicing precision, possibilities of adjustment to new situations, developing reading and mathematical skills.

Life satisfaction means general cognitive evaluation of an individual's subjective well-being (Diener et al.,1985). Very often it is measured with one item or question: "How satisfied are you with your life overall?" all according to [23]. Numerous research included the application of positive and negative emotions/feelings through the PANAS questionnaire [24] as a means of connecting well-being/happiness and purpose/quality of life [25], [26], [27].

The time devoted to online gaming is associated with subjective well-being. Life satisfaction is a construct defining association with numerous positive life aspects such as physical and mental health, self-confidence, efficiency, and optimism. Compulsive online gaming is the result of motivation to mitigate actual dissatisfaction [28]. These studies show that what should be expected is a negative relation between the IGD and life satisfaction [19].

Von der Heiden et al. [7] compared research results of various authors and discovered that the level of addiction to online/video gaming was associated with personal characteristics, such as low self-esteem and low self-efficiency, aggression and anxiety, and that it was also connected to clinically identified symptoms of depression and anxiety disorders (Wang et al., 2018 according to [7]).

Lauri Korajlija et al. [23] conducted research on three independent samples of students and adult employees by applying the DASS-21 Scale. The goal was to determine the level of reliability, i.e., the constructive and criterial validity of measuring life satisfaction with one item. The research included application of two life satisfaction assessment tools, and additionally in every sample, application of different emotional state assessment tools (CORE-34, CORE-10 and DASS-21). This research results show that life satisfaction is negatively associated with depression, anxiety, and general emotional distress. Permanently reduced level of life satisfaction may negatively reflect on overall mental health and daily functioning [23].

Some authors point out connections of actual human contact relations and virtual world friendships. Cole and Griffiths [29] state that many gamers play with at least one person they know in real life, so online gaming only deepens their friendship and ensures it gains better quality [30]. These same authors believe that online gaming serves as a stress, anxiety, and depression release channel. Individuals prone to dysfunctional use of the internet and excessive gaming often face mental health and psycho-social behavior issues, which include poor school results, financial and marital problems, and social exclusion.

The results of the study by Isralowitz et al. [11] show that gaming disorder is associated with lower levels of psychological well-being, including increased depression, anxiety, and loneliness. It was also noted that participants with this disorder often reported lower levels of life satisfaction and social connectedness.

The construct of positive and negative affect schedule was introduced by Watson, Clark and Tellegen [24], where high positive affect schedule means good concentration, pleasure and energy and is described as a level characterized by enthusiasm and vivid behavior, whilst low positive affect schedule is characterized by sadness and apathy. High negative affect schedule includes negative emotions and stages like disgust, guilt, hatred, anxiety or fear, and low negative affect schedule comprises calmness and stability [31]. Research of positive and negative affect by applying PANAS [24] proved connection between well-being/happiness and the purpose of life [25], [26], [27]. On a sample of 480 students, association has been determined between internet addiction and symptoms of depressive conditions as well as aggressive behavior and symptoms of ADHD [32].

Negative consequences of frequent online gaming include negative effects such as stress and unsuccessful problem solving [33], lower psycho-social well-being and loneliness [19] and psychosomatic issues [34], [33]. Excessive online gaming attracts individuals who, due to their deteriorated psychological functioning, do not face problems but use online gaming to avoid actual problems and escape to a different environment. This leads to addictive behavior and clinical implications [35]. Recent research on problematic online gaming suggests that it can have significant psychological implications, particularly when individuals turn to gaming as an escape from real-world problems. Studies indicate that online gaming, while often driven by the pursuit of pleasure and positive emotions, can lead to addictive behaviors when it becomes a coping mechanism for negative emotional states like depression or dissatisfaction with life. This behavior is linked to the avoidance of responsibilities. Studies have shown that excessive gaming can lead to emotional regulation issues, where players become dependent on gaming as their primary source of emotional comfort. It has been suggested that experiencing a balance of positive and negative emotions is key to mental well-being, with a ratio favoring positive emotions, typically above 3:1. However, the intense negative emotions associated with gaming can often disrupt this balance and lead to increased frustration and anxiety [36].

Aldao et al. [37] point out that regulation strategies, such as problem recognitions and problem solving, are associated with lower level of depression symptoms. The same authors state that continuous transferring of rules and strategies in a game lead to flexible and more efficient emotional experience and that studying game advantages within a game mitigates frustration and anxiety. Whatever the case, the researchers argue that it is important to investigate to which extent online gaming is used to make the gamers feel better, and in which moment online gaming turns into a strategy to avoid actual responsibilities which leads to negative outcomes.

The global goal of this research was to determine association between the time students spend playing online games and subjective well-being, emotional states and affect schedules.

Based on this goal, the following research questions were set:

1. To determine how many hours per day, on average, students spend online gaming
2. To investigate how students assess their satisfaction with their own lives and the frequency and intensity of unpleasant emotional states (DASS-21)
3. To determine how students assess their own positive and negative affect (PANAS)
4. To identify any gender differences in self-assessment of the frequency and intensity of unpleasant emotional states of anxiety, depression and stress (DASS-21) and the intensity of positive and negative affect (PANAS)

5. To identify any connections among the variables of the frequency of online gaming, subjective well-being, the frequency and intensity of unpleasant emotional states of anxiety, depression and stress (DASS-21) and self-assessment of positive and negative affect (PANAS).

2. Research Methods

This research was conducted online with preliminary written consent of the Faculty Ethics Committee and the consent of the University of Zagreb. Research is a part of Doctoral thesis Vučić (2022)[38], supervised by coauthors. The participation was voluntary, and information was collected and processed anonymously.

2.1. Respondents' Sample

This research was conducted on a sample of up to N = 1000 students at one University in the Republic of Croatia, of whom N_F = 520 (52.0%) were female and N_M = 480 (48.0 %) were male. The average age of the respondents of both genders is expressed as arithmetic mean with standard deviation of M = 23.14, SD = 3,20. The average age of female students who participated in the research was M_F = 23.04, ds = 3,58, and of male students M_M = 23.24, ds = 2,72.

The majority of students, N = 732 (73.2%), were undergraduates, N = 199 (19.9%) of students attended the first two years of graduate studies and all *other* years of studies, including postgraduate doctoral studies, were attended by N = 69 students (6.9%).

Throughout the pilot investigation stage, details of N = 1467 students of the University in Zagreb were collected, of whom N_F = 744 (50.7%) were female students and N_M = 723 (49.3%) were male students studying at the faculties of Natural, Technical, Biomedical, Medical, Biotechnical Sciences, Social Studies, Humanities and Art Programs. The final sample was stratified in proportion to the total number of enrolled students per individual scientific / art strand, in accordance with statistic indicators of the Croatian Bureau of Statistics Announcement, ISSN 1330-0350, Zagreb, https://sredisnjikatalogrh.gov.hr and the number of students enrolled in academic year 2020-2021.

2.2. Measuring instruments

The measuring instrument listed below were used in the research, adjusted in the form of online *google form* questionnaire. For all questionnaires, the preliminary approvals for the use of measuring instruments were obtained.

1. Self-assessment of time devoted to online gaming:

The item "How often do you play online games" was used to assess the duration of online gaming. The respondents would select one of the suggested answers: a) up to 1 hour per day (up to 7 hours per week); b) between 1 and 2 hours per day (between 7 and 14 hours per week); c) between 2 to 4 hours per day (between 15 and 28 hours per week); d) between 4 to 6 hours per day (between 29 and 42 hours per week).

2. The questionnaire item on subjective well-being:

To assess their life satisfaction the respondents were asked the following question: "How satisfied are you with your life overall?" This Item was adopted from the *Subjective Well-being* Questionnaire [39]. The respondents provided their answers on a scale from 0 (entirely dissatisfied) to 10 (entirely satisfied) [39].

3. The questionnaire on assessing the frequency and intensity of unpleasant emotional states DASS-21 *(Depression, Anxiety and Stress Scale-21):*

The Questionnaire on assessing the frequency and intensity of unpleasant emotional states, Depression, Anxiety and Stress Scale DASS-21 [40] consists of three depression subscales (DASS-21D), anxiety (DASS-21A) and stress (DASS-21S). Every subscale has 7 items. The answers were provided on a Likert scale ranging from 0 ("did not apply to me at all") to 3 ("almost entirely" or "most of the time it applied to me "). The respondents would select how much a certain statement applied to them in the previous week. The score for each subscale ranged from 0 to 21. This is calculated by adding up the scores of the 7 items comprising each scale and the total theoretical range is a sum of the scores of all subscales from 0 to 63.

In Croatia a validation of Croatian adaptation of DASS-21 questionnaire was conducted in 2012 [41] indicating high reliability of the questionnaire expressed as Cronbach Alpha Coefficient (α = 0.950). In this research, the reliability of DASS-21 questionnaire expressed as Cronbach Alpha Coefficient **is** α = 0 .908 for the depression subscale, α = 0.854 for the anxiety subscale and α = 0.891 for the stress subscale [38].

4. Positive/Pleasant and Negative/Unpleasant Affect Schedule – PANAS:

The PANAS scale *(Positive-PA and Negative-NA Affective Schedule)* [24] was used to assess pleasant and unpleasant affect. PANAS, with 20 items measures the frequency of experiencing pleasant and unpleasant

emotional states in the last several weeks (10 items for pleasant and 10 items unpleasant emotions). On a 5-Point Likert Scale (1 – *very little/not at all* to 5 – *extremely*) the respondents assess to what extent they are characterized by statements describing various emotional states. The reliability of the entire measuring instrument expressed as Cronbach Alpha is $\alpha = 0{,}870$ [24]. The reliability (Cronbach Alpha) of PANAS' 10-item factors of *pleasant affective experience* in this research amounts to $\alpha = 0.880$ which demonstrates very high reliability of a particular factor. The Cronbach Alpha 10-item factors of *unpleasant affective experience* in this research amounts to a high $\alpha = 0.919$, which also means very high reliability [38].

3. Results and discussion

The presentation of results is based on answers to research questions per the following units:

3.1. Descriptive Indicators of Total Time which Students Devote to Online Gaming:

To provide answers to research issues relating to duration of online gaming, the total time students devote to online gaming was determined first: a) up to 1 hour per day (up to 7 hours per week); b) between 1 and 2 hours per day (between 7 and 14 hours per week); c) between 2 and 4 hours per day (between 15 and 28 hours per week); d) between 4 and 6 hours per day (between 28 and 42 hours per week); e) more than 6 hours per day (more than 42 hours per week). The obtained results show respondents playing online games in percentages and during periods given below: up to 1 hour per day / 7 hours per week: **60.3 %**; 1 to 2 hours per day / 7 to 14 hours per week: **17.1 %**; 2 to 4 hours per day / 15 to 28 hours per week: **14.7 %**; 4 to 6 hours per day /29 to 42 hours per week: **5.5 %**; more than 6 hours per day / more than 42 hours per week: **2.4%**.

3.2. The Results of Subjective Well-being and Assessment of the Frequency and Intensity of Unpleasant Emotional States of Depression, Anxiety and Stress

The Results of Subjective Well-being and Assessment of the Frequency and Intensity of Unpleasant Emotional States are shown below.

3.3. Descriptive Indicators of Subjective Well-being Based on Item "How satisfied are you with your life overall?"

Subjective well-being is based on the item listed in the life satisfaction questionnaire which reads: "How satisfied are you with your life overall?" [39]. This item applied on a sample of N = 1000 students provided the results given in Table 1.

How satisfied are you with your life?		N	%	M	Sd
How satisfied are you with your life overall?	1 Completely dissatisfied	17	1.7%		
	2	14	1.4%		
	3	35	3.5%		
	4	45	4.5%		
	5	67	6.7%		
	6	93	9.3%		
	7	193	19.3%		
	8	275	27.5%		
	9	170	17.0%		
	10 Completely satisfied	91	9.1%		
	Total	1000	100.0%	7.21	2.01

Table 1. The Life Satisfaction Scale Scores – Respondents' Answers to Item "How satisfied are you with your life overall?"

The subjective well-being scores presented in Table 1, slightly distributed towards the positive part of the 1-10 scale (1 being Completely dissatisfied and 10 Completely satisfied), show that the majority of respondents evaluated their life satisfaction as positive. The respondents' answers arithmetic mean is M = 7,21, SD = 2,01.

3.4. Results of the Statistical Analysis Referring to Self-assessment of the Frequency and Intensity of Emotional States DASS-21 *(*Depression, Anxiety and Stress Scale DASS-21)

To provide a detailed insight into self-evaluation of the frequency and intensity of unpleasant emotional states DASS-21 *(Depression, Anxiety and Stress Scale)*[40], the scores were analyzed according to individual subscales: Depression (DASS-21D), Anxiety (DASS-21A) and Stress (DASS-21S).

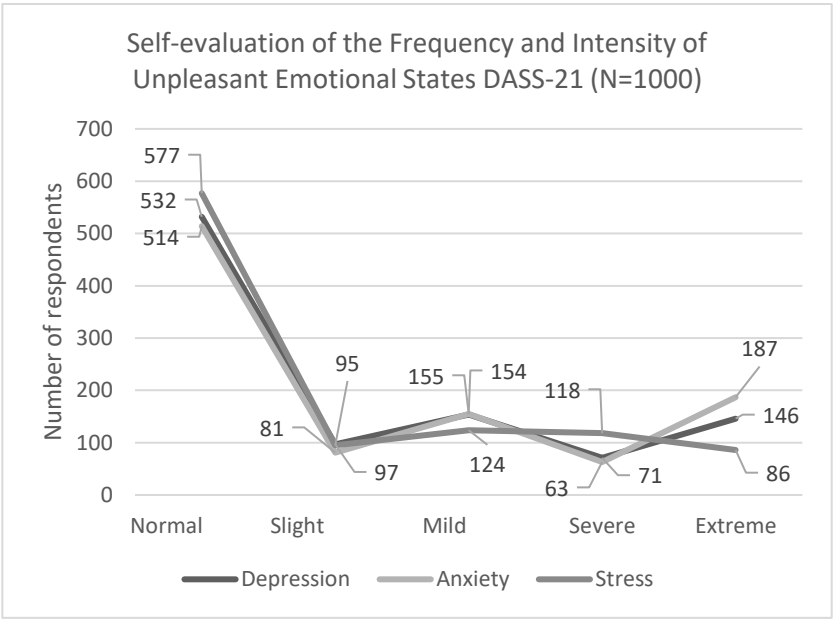

Figure 1. Distribution of results after categorization on respective subscales in DASS-21: Depression, Anxiety and Stress

The Figure 1 results show that the answers given by the majority of the respondents appear in the category of normal state of depression, anxiety, and stress, but there are also respondents in the range of slight to extreme for all three categories. The limit values on the depression, anxiety and stress self-evaluation subscales were defined according to the limit values and instructions of the authors [40]. A total of N = 187 (18.7%) of the respondents evaluated their state of anxiety as extreme or severe N = 63 (6.3%). A total of N = 146 (14.6%) evaluated their state of depression as extreme or severe N = 71 (7.1%). A total of N = 86 (8,6 %) of the respondents evaluated their state of stress as extreme or severe N = 118 (11.8%). The results indicate that these students' mental health has highly likely been impaired and would require further diagnostics and therapies. Lauri Korajlija et al. [23] also determined that life satisfaction is negatively associated with depression, anxiety and general emotional distress. The results may be interpreted in relation to the existing association between well-being/happiness and purpose/life satisfaction as determined by [25], [26], [27].

3.5. Descriptive indicators referring to self-assessment of Positive and Negative Affect, based on PANAS scale responses

Students' self-assessment of the intensity of positive and negative affect or emotional states intensity, according to the scores of the PANAS Scale applied on an N = 1000 student sample, provided results presented in Figure 2. Respondents were selected based on their answers to specific individual statements. Students evaluated their own positive and negative affective experience of active engagement, attention, excitement,

power, pride, enthusiasm, thrill, determination, vigilance and interest on a 1 – 5 scale (1 – completely disagree to 5 – completely agree).

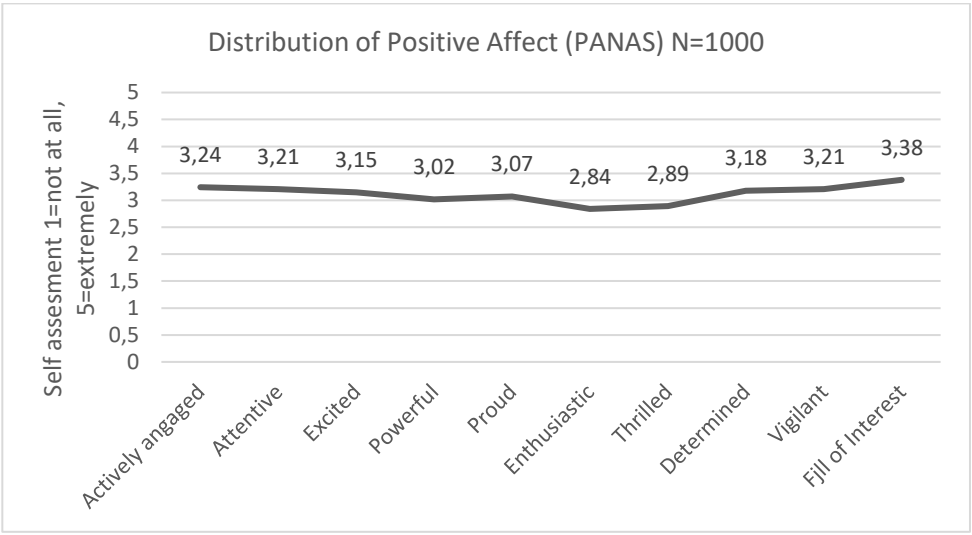

Figure 2. Intensity assessment results presented on a Positive Affect PANAS Scale

The results presented in Figure 2 diagram show a range of self-assessment arithmetic means, from M = 2.84, SD = 1.26 for enthusiasm to M = 3.38, SD = 1.12 for interest.

Additionally, on the same 1-5 scale (1 = completely disagree to 5 = completely disagree) the students assessed the intensity of their own negative affect such as wrong, nervous, hostile, quick-tempered, edgy, ashamed, scared, unhappy, timid and irritated. The results are shown in Figure 3.

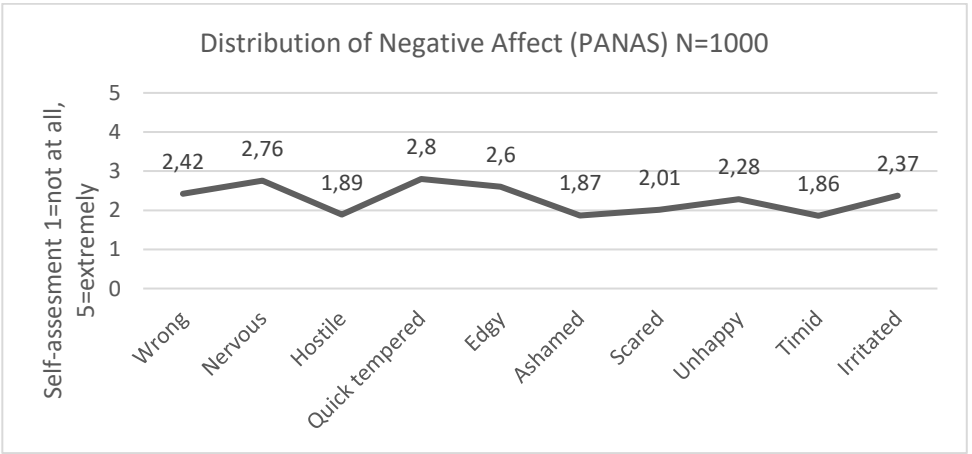

Figure 3. Intensity of Negative Affect Results Shown on Negative Affect PANAS Scale

The self-assessment results shown in Figure 3 diagram range from M = 1.86, SD = 1.17 for timidity to M = 2.8, SD = 1.32 for agitation (nervousness). These results show that the self-assessment of negative and positive states is relatively consistent and the values on the 1-5 scale are distributed around mean values. They can be compared and interpreted in relation to the results of previous research conducted by Watson et al. [24] who concluded that high intensity of positive affect was associated with high concentration, pleasure and energy, and low intensity with sadness and apathy. According to previous research [31], low intensity of negative affect is associated with calmness and stability.

3.6. Gender differences in self-assessment of Pleasant and Unpleasant Affect according to PANAS Scale and self-assessment of the Frequency and Intensity of Unpleasant Emotional States (DASS-21)

To determine any gender differences in self-assessment of pleasant and unpleasant affect and any gender differences in self-assessment of frequency and intensity of unpleasant emotional states, the results of the PANAS and DASS-21 Scale applied on the N = 1000 student sample were compared. The results are shown in Table 2.

	Gender	N	$\bar{x}$	Sd	Min	Max
DASS-21						
Depression	M	480	10.8917	11.13613		
	F	520	13.3654	11.58786		
	Total	1000	12.1780	11.43464	.00	42.00
Anxiety	M	480	7.4917	8.21984		
	F	520	12.0538	10.56100		
	Total	1000	9.8640	9.77451	.00	42.00
Stress	M	480	11.8667	9.92324		
	F	520	17.3846	11.70306		
	Total	1000	14.7360	11.22392	.00	42.00
PANAS						
Positive Affect	M	480	3.2200	.78057		
	F	520	3.0242	.82574		
	Total	1000	3.1182	.80990	1.00	5.00
Negative Affect	M	480	2.0981	.87785		
	F	520	2.4606	.99221		
	Total	1000	2.2866	.95592	1.00	5.00

Table 2. Distribution of self-assessment results referring to the frequency and intensity of unpleasant emotional states (DASS-21) and individual positive and negative affect (PANAS) according to gender (N = 1000)

The results presented in Table 2 show that male students in average achieve lower DASS-21 Scale scores (depression, anxiety, and stress) compared to their female peers, or that depression, anxiety, and stress are more common with female students. Additionally, female students demonstrate more expressed pleasant and unpleasant affective experiences per PANAS compared to male student. The arithmetic means and standard deviation are shown in Table 2.

To verify whether the differences between female and male students who participated in the questionnaires on self-assessment of the frequency and intensity of unpleasant emotional states DASS-21 and self-assessment of their own positive and negative affect based on the PANAS Scale score, are statistically significant, the t-test was applied. All T-test scores were statistically significant, and their results are shown in Table 3.

All t-test scores shown in Table 3 are statistically significant, which confirms that male and female respondents are statistically significantly different when it comes to the level of self-assessment of unpleasant emotional states per DASS-21: Female students show higher scores in self-assessment of depression, anxiety and stress that their male peers. Additionally, female students have more pronounced pleasant and unpleasant affective experiences, which was also confirmed with PANAS scale scores.

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig. (2-tailed)
DASS-21						
Depression	Equal variances assumed	3.679	.055	-3.436	998	**.001**
	Equal variances not assumed			-3.442	996.376	.001
Anxiety	Equal variances assumed	52.903	.000	-7.579	998	.000
	Equal variances not assumed			-7.654	970.735	**.000**
Stress	Equal variances assumed	31.048	.000	-8.009	998	.000
	Equal variances not assumed			-8.061	990.959	**.000**
PANAS						
Positive Affect	Equal variances assumed	2.275	.132	3.845	998	**.000**
	Equal variances not assumed			3.854	997.432	.000
Negative Affect	Equal variances assumed	14.712	.000	-6.098	998	.000
	Equal variances not assumed			-6.128	996.226	**.000**

Table 3. T-test gender comparison of subjective well-being (DASS-21) and self-assessment of individual positive and negative affect (PANAS) on N = 1000 respondents

Considering that DASS-21 Scale is not a diagnostic instrument and is rather a means of depression, anxiety and stress symptoms level self-assessment, it can be of use to medical experts in their evaluation of risk but not for diagnostic purposes [42]. The scores obtained on the self-assessment scale ranging from slight to extreme indicate that these students need further diagnostics, support and as applicable, adequate treatment. These scores can be compared with the results of Isralowitz et al. [11], who emphasize that issues of anxiety and depression are also to be associated with internet addiction.

3.7. Correlation analysis of the time students devote to online gaming and their subjective well-being, the depression, anxiety, and stress scale (DASS-21) and the positive and negative affect schedule (PANAS)

To determine any existing correlation between the amount of time students devote to online gaming and the self-assessment of a) life satisfaction and b) positive and negative affect, the Spearman's Rank Correlation Coefficient was applied. Table 4 shows Spearman's Rank Correlation Coefficient for:

a) The analyzed online gaming frequency variables according to the following categories: up to 1 hour per day / up to 7 hours per week, 1 to 2 hours per day / 7 to 14 hours per week, 2 to 4 hours per day / 15 to 28 hours per week, 4 to 6 hours per day / 29 to 42 hours per week and more than 6 hours per day / more than 42 hours per week and subjective well-being and self-assessment of the frequency and intensity of unpleasant emotional states (DASS-21)

b) The correlation coefficients among online gaming categories according to frequency: up to 1 hour per day / up to 7 hours per week, 1 to 2 hours per day / 7 to 14 hours per week, 2 to 4 hours per day / 15 to 28 hours per week, 4 to 6 hours per day / 29 to 42 hours per week and more than 6 hours per day / more than 42 hours per week and self-assessment of positive and negative affect based on the PANAS Scale scores.

The analysis of Spearman's rank correlations presented in Table 4 indicated that the statistically significant frequency of online gaming is negatively associated with life satisfaction ($r = -0.102^{**}$, $p = 0.001$), with stress assessed by DASS–21 ($r = -0.070^{*}$, $p = -0.027$) and positive affect assessed based on answers provided in PANAS ($r = -0.079^{*}$, $p = -0.013$).

Life satisfaction demonstrated statistically significant negative correlation with the state of depression in DASS-21 ($r = -0.621^{**}$, $p = 0.000$), anxiety ($r = -0.395^{**}$, $p = 0.000$) and stress ($r = -0.458^{**}$, $p = 0.000$) and with unpleasant affect ($r = -0.501^{**}$, $p = 0.000$) and statistically positive correlation with pleasant affective experience in PANAS ($r = 0.527^{**}$, $p = 0.000$).

The DASS-21 subscale results referring to depression provide statistically significant correlation with anxiety ($r = 0.630^{**}$, $p = 0.000$), stress ($r = 0.750^{**}$, $p = 0{,}000$) and unpleasant affective experience in PANAS Scale ($r = 0.723^{**}$, $p = 0.000$). The result on the depression self-assessment subscale in DASS-21 is statistically significantly negatively correlated with pleasant affect according to PANAS ($r = -0.486^{**}$, $p = 0.000$). The

anxiety subscale in DASS-21 negatively correlates with positive affect according to PANAS ($r = -0.269^{**}$, $p = 0.000$) and also, according to PANAS, positively correlates with negative affect ($r = 0.797^{**}$, $p = 0.000$). To conclude, lower frequency of online gaming contributes to life satisfaction, lower levels of stress and more pleasant affect. Similar results were also obtained by authors that point out to negative consequences of online gaming such as stress and unsuccessful problem solving [33], lower level of psycho-social well-being and loneliness [19] as well as psycho-somatic issues [34], [33].

			ONLINE GAMING	LIFE SATISFACTION	DASS-21			PANAS	
			1 How often do you play online games	2 How satisfied are you with your life	3 Depression	4 Anxiety	5 Stress	6 Positive affect	7 Negative affect
ONLINE GAMING	1 How often do you play online games	r	1.000	-.102**	.029	-.059	-.070*	-.079*	-.043
		p	.	.001	.368	.064	.027	.013	.171
		N	1000	1000	1000	1000	1000	1000	1000
LIFE SATISFA-CTION	2 How satisfied are you with your life	r	-.102**	1.000	**-.621****	-.395**	-.458**	**.527****	**-.501****
		p	.001	.	.000	.000	.000	.000	.000
		N	1000	1000	1000	1000	1000	1000	1000
DASS-21	3 Depression	r	.029	**-.621****	1.000	**.630****	**.750****	**-.486****	**.723****
		p	.368	.000	.	.000	.000	.000	.000
		N	1000	1000	1000	1000	1000	1000	1000
	4 Anxiety	r	-.059	-.395**	**.630****	1.000	**.750****	-.269**	**.700****
		p	.064	.000	.000	.	.000	.000	.000
		N	1000	1000	1000	1000	1000	1000	1000
	5 Stress	r	-.070*	-.458**	**.750****	**.750****	1.000	-.322**	**.797****
		p	.027	.000	.000	.000	.	.000	.000
		N	1000	1000	1000	1000	1000	1000	1000
PANAS	6 Positive affect	r	-.079*	**.527****	**-.486****	-.269**	-.322**	1.000	-.312**
		p	.013	.000	.000	.000	.000	.	.000
		N	1000	1000	1000	1000	1000	1000	1000
	7 Negative affect	r	-.043	**-.501****	**.723****	**.700****	**.797****	-.312**	1.000
		p	.171	.000	.000	.000	.000	.000	.
		N	1000	1000	1000	1000	1000	1000	1000

** Significant Correlation Level is 0.01
* Significant Correlation Level is 0.05

Table 4. Spearman's Rank Correlation Coefficient Among the Variables Relating to Online Gaming Frequency, Life Satisfaction, Self-assessment of Unpleasant Emotional States (DASS-21) and Self-assessment of Positive and Negative Affect (PANAS)

Furthermore, a negative relationship between IGD and life satisfaction was determined by Lemmens et al.[19]. The results may be interpreted in relation to the [10] research; they had determined that it was the students' population which was highly risky when it comes to internet addiction. The research conducted by [28] also indicate that online gaming is a potential way of mitigating actual dissatisfaction in real life.

4. Practical Implications

The results indicate that over one half of the students (60.3% of respondents) practice online gaming on average less than one hour per day or do not play online games at all. However, a further 17.1% or 14.7% of the respondents play online games about 2 to 4 hours or 5 to 6 hours per day, respectively. The raising concern is that 2.4% of respondents devote more than 5 hours per day to online gaming, which may negatively impact their social, emotional, and cognitive functioning.

When asked how they assess their life satisfaction, the majority of respondents replied that they were satisfied, i.e., on scale from 1 – completely dissatisfied to 10 – completely satisfied, the arithmetic mean can be estimated around 7 (M = 7.21, SD = 2.01). Nevertheless, it should be pointed out that a percentage of 11.1% (N = 177 respondents) express their dissatisfaction with life. These results indicate the existing need for professional assessment and, as applicable, further psychological professional treatment, which especially refers to N = 17 (1.7% of students who are completely dissatisfied with their own lives). Another concerning finding is that 25% of the respondents assess their state of anxiety as severe or extreme, 15.7% of students believe that their state of depression is severe or extreme and 20.4% of students experience severe or extreme stress symptoms.

Using a PANAS Scale the students assessed their own positive affect expressed in activities, attention, excitement, strength, pride, enthusiasm, thrill, determination, vigilance and interest and their own negative affect expressed as something wrong, nervous, hostile, quick-tempered edgy, ashamed, scared, unhappy, timid, and irritated. The results speak in favor of the fact that students assess affective experience around mean values of the 1-5 scale, with assessment of positive affect being slightly more intensive than the assessment of negative affect.

Male respondents on average achieve lower DASS-21 scores on subscales referring to depression, anxiety and stress compared to female respondents, i.e., depression, anxiety and stress are more expressed in female students. Furthermore, based on the scores of the PANAS Scale intended for self-assessment of the intensity of positive and negative affect, it was confirmed that in female students the statistically significant pleasant and unpleasant affective experience is more pronounced compared to their male peers.

Students who are more frequently/excessively involved in online gaming are less satisfied with their lives, often subject to stress and have less positive affective experience than students who do not play these games or play them less commonly. Students who are satisfied with their lives experience depression, anxiety and stress less commonly, their negative affect is of lower intensity and positive of higher. Self-assessment of depression is associated with anxiety, stress, and more intensive affective experience. Anxiety is negatively correlated with positive affect and positively with negative affective experience.

5. Limitations and Future Research

The main methodological limitation of this research relates to the sampling process, which was based on the proportion of enrolled students across various scientific fields. Additionally, some students did not complete the questionnaire, potentially affecting the representativeness of the sample.

In conclusion, moderate but not excessive online gaming among students appears to contribute to higher life satisfaction, reduced stress levels, and more positive and intense affective experiences. These findings could inform the development of student activity programs aimed at optimizing the time students spend on online gaming for better well-being.

The study's findings have educational implications for promoting a balanced lifestyle that supports students' mental and physical health. Future research could expand the sample to include high school students and explore the relationship between the time they spend on online gaming and their subjective well-being, emotional states, and affective experiences.

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