The Internet and Smartphone Addictions in a Sample of University Students: The Role of Search for Meaning in Life

Üniversite Öğrencilerinden Oluşan Bir Örneklemde İnternet ve Akıllı Telefon Bağımlılıkları: Yaşamda Anlam Arayışının Rolü

Pinar Dursun[1], Bedir Sala[2], Ahmet Uzer[3]

[1] Department of Psychology, Afyon Kocatepe University

[2] Department of Sociology, Afyon Kocatepe University

[3] Department of Psychiatry, Afyonkarahisar Health Sciences University

Abstract

Aim: In this study, we aimed to explore whether problematic and addictive uses of smartphones and the Internet conceptually differ from each other and gauge the predictive utility of the meaning in life dimensions (meaning of presence and search for meaning) and psychological health indicators (stress, depression, and anxiety) for such uses in university students.

Methods: The cross-sectional study included a total of 483 (317 females, 166 males) participants (mean age: 21.71±1.75 years) recruited from the Afyon Kocatepe University and the Afyonkarahisar Health Sciences University between December 2019 and February 2020. A sociodemographic form, the Fagerström Test for Nicotine Dependence, the Meaning in Life Questionnaire, the Internet Addiction Test, and the Smartphone Addiction Scale were administered.

Results: The findings suggested that smartphone and Internet addictions were highly correlated and both addictions could be predicted by the depression and stress indicators and the search for meaning dimension. Males tended to use the Internet via computers rather than smartphones.

Conclusion: We found that in case of stress, depression, and loss of meaning in life students were more likely to develop Internet and smartphone addictions as they tried to reconstruct or restore their meaning systems. Therefore, the evaluation and treatment strategies should include teaching how to reconstruct meaning systems and cope with stressful life situations in an adaptive way.

Keywords: Internet addiction; meaning in life; problematic Internet use; problematic smartphone use; search for meaning; smartphone addiction

Öz

Amaç: Bu çalışmada üniversite öğrencileri arasında akıllı telefon ve İnternet'in problemli ve bağımlılık teşkil edici biçimde kullanımının kavramsal olarak birbirinden farklı olup olmadığını araştırmak ve yaşamda anlamın boyutlarının (anlam varlığı ve anlam arayışı) ve psikolojik sağlık ile ilgili göstergelerin (stres, depresyon, anksiyete) bu gibi kullanımları ne ölçüde yordayıcı olduğunu saptamak amaçlanmıştır.

Yöntem: Kesitsel çalışmamız Aralık 2019—Şubat 2020 döneminde Afyon Kocatepe Üniversitesi ile Afyonkarahisar Sağlık Bilimleri Üniversitesi'nden ulaşılan toplam 483 (317 kadın, 166 erkek) katılımcı (ortalama yaş: 21,71±1,75 yıl) içerdi. Katılımcılara bir sosyodemografik form ile birlikte Fagerström Nikotin Bağımlılığı Testi, Yaşamda Anlam Ölçeği, İnternet Bağımlılığı Testi ve Akıllı Telefon Bağımlılığı Ölçeği uygulandı.

Bulgular: Akıllı telefon ve İnternet bağımlılıklarının birbiriyle yüksek düzeyde ilişkili olduğu ve iki bağımlılığın da depresyon ve stres göstergeleri ve anlam arayışı boyutu ile yordanabileceği görüldü. Erkekler İnternet'i akıllı telefondan çok bilgisayarda kullanma eğilimi içindeydi.

Sonuç: Stres, depresyon ve yaşamda anlam kaybı halinde anlam sistemlerini yeniden yapılandırmaya ya da kazanmaya çalışan öğrencilerin İnternet ve akıllı telefon bağımlılığı geliştirme olasılığının daha yüksek olduğu görülmüştür. Bu nedenle değerlendirme ve tedavi stratejileri, yeni anlam sistemleri oluşturmayı ve yaşamdaki stresli durumlarla adaptif bir biçimde başa çıkmayı öğretmeyi içermelidir.

Anahtar Sözcükler: akıllı telefon bağımlılığı; akıllı telefonların problemli kullanımı; anlam arayışı; İnternet bağımlılığı; İnternet'in problemli kullanımı; yaşamda anlam

INTRODUCTION

With the advances in recent technology, Internet and smartphone use has been on the rise globally, particularly in adolescents and university students. Besides making calls, smartphones today offer a wide variety of other functions, such as chatting with friends, using social media, online-gaming, web-browsing, banking, and shopping. The UK communication regulator Ofcom (1) reported a smartphone use rate of 93%, and the Turkish Statistical Institute data revealed that the rate of Internet use among individuals aged 16 to 74 years reached 79% in 2020, with a 4% increase compared to the 2019 figures (2). Other research conducted in 2019 showed that 91.8% of South Korean children aged 3 to 9 years use the Internet for about 35 hours per week (3). Furthermore, there is a shift toward Internet use via smartphones rather than laptops, with smartphones themselves turning into "small computers" or "handheld computers". The South Korean Internet Security and Agency data showed that the rate of households owning computers has gradually decreased since 2012 (74.7% in 2017) while the rate of households owning smartphones has reached 94.1% (4).

Such statistics from different countries indicate that societies have been becoming more and more "smartphone-dependent", together with serious new concerns about the addictive and problematic/pathological use of online technology, especially among university students as a vulnerable group for both types of addiction. Internet use, whether it be through smartphones or computers, meets different needs in the lives of students, including schoolwork, web-search, self-improvement, and social networking. It is important but not easy to distinguish between the due use and misuse or overuse of the Internet-based technology. Some studies suggest that smartphone and Internet addictions are quite interrelated (5), whereas others report distinctions between the two entities based on sex, personality characteristics, and demographic differences (6–8). For instance, Choi et al. (7) reported that the risk factors for smartphone addiction were female sex, anxiety, and alcohol use while the risk factors for Internet addiction were male sex and anxiety. Lee et al. (8) found that smartphones were used more by females and the Internet by males for online gaming. However, the dual users constitute the most problematic group in the investigation of both addictions.

A great deal of research has shown that symptoms of addictive/pathological smartphone and Internet use, such as habitual checking behaviors, extreme use/dependence, withdrawal difficulties, and interference in psychosocial functioning are associated with various psychological entities including anxiety, depression, alcohol abuse, aggression, smoking, loneliness, boredom, low self-esteem, obsessive–compulsive behavior, attention deficits, impulsivity, and neuroticism (7–15), as well as with physical problems such as neck stiffness, blurred vision, back pain, and sleep and appetite loss (16,17).

In addictive habits there are protective factors such as a sense of meaning in life. The sense of meaning in life is defined as the perception and belief that life has a purpose, mission, importance and significance (18,19). It has two dimensions: experiencing meaning (the presence of meaning in life) and search for meaning, which refers to active search for understanding the meaning in life (18–20). The presence of meaning or a meaningful life has consistently been found to be correlated with well-being and psychological health indicators such as greater happiness and life satisfaction and less depression, anxiety and loneliness, and plays a protective or buffering role in coping with adversities, unlike the search for meaning, which generally works in the opposite direction (18–24).

Although the online activities of people vary greatly based on their personality traits, interests, attitudes, and demographic characteristics, it is common that they mirror the offline life and, for some people, the Internet can be a main source of meaning in life, especially in the course of the ongoing COVID-19 pandemic. The sense of meaning in life is generally derived from family and intimate relationships as well as from religion, personal development and material pursuits (25–27). The Internet appears to be one of the most convenient methods to communicate with loved ones, socialize and make new friends (online multiplayer games, social media), reach spiritual and developmental information (web-search, YouTube videos, blogs), and material pursuits (electronic transactions). However, the exact role of search for life meaning in problematic uses of smartphones and the Internet re-

Table 1. Sociodemographic characteristics

	n	%		n	%
Sex			**University**		
Female	317	65.6	AKU	381	78.9
Male	166	34.4	AHSU	102	21.1
Marital status			**GPA**		
Married	6	1.2	<2	58	12
Single	468	96.9	2–2.50	182	37.8
Divorced/widowed	9	1.9	2.51–3.50	220	45.6
			≥3.51	22	4.6
Program/Faculty			**Grade**		
Science and letters	183	38.7	First year	39	8.1
Education	55	11.6	Second year	115	23.9
Law	89	18.8	Third year	190	39.3
Tourism	44	9.3	Fourth year	104	21.6
Veterinary and medicine	102	21.6	Fifth ↑	34	7
Work status			**Family monthly income**		
Full-time	16	3.4	<2000 TL	87	18
Part-time	48	10.1	2000–4000 TL	232	48
Not working	410	86.5	4001–7000 TL	121	25.1
			≥7001 TL	43	8.9
Current residence			**Individual monthly income**		
State dormitory	197	40.8	<500 TL	107	22.4
Private dormitory	57	11.8	500–1000 TL	255	53.3
Private apart/flat	186	38.5	1001–1500 TL	69	14.4
Other	38	7.9	≥1501 TL	47	9.8
Maternal education level			**Paternal education level**		
Illiterate	27	5.6	Illiterate	12	2.5
Literate (drop-out)	15	3.1	Literate (drop-out)	9	1.9
Elementary school	223	46.2	Elementary school	143	29.6
Secondary school	79	16.4	Secondary school	100	20.7
High school	94	19.5	High school	127	26.3
University	36	7.5	University	69	14.3
Other	9	1.9	Other	23	4.8

AKU: Afyon Kocatepe University; AHSU: Afyonkarahisar Health Sciences University; GPA: grade point average

Table 2. The correlation matrix of variables

Measures	1	2	3	4	5	6	7	8
1. Internet addiction	1	0.79**	-0.22**	0.16**	0.43**	0.37**	0.45**	0.07
2. Smartphone addiction		1	-0.20**	0.18**	0.39**	0.34**	0.42**	0.06
3. Presence of meaning			1	0.11*	-0.47**	-0.30**	-0.39**	0.05
4. Search for meaning				1	-0.01	0.00	0.02	-0.04
5. Depression					1	0.68**	0.75**	-0.04
6. Anxiety						1	0.72**	-0.04
7. Stress							1	-0.08
8. Age								1
M	32.52	89.34	25.83	23.85	7.05	6.17	7.84	21.71
SD	18.91	33.18	6.20	7.76	5.05	4.57	4.79	1.75
N	483	483	483	483	483	483	483	483

M: mean; N: total number of participants; SD: standard deviation

* $p < 0.05$

** $p < 0.01$

mains to be determined due to the limited literature on the subject. A study addressing the meaning in life dimensions within the context of the relationship between online game addiction and bullying in Chinese adolescents found that, contrary to search for meaning, presence of meaning functioned to protect from harmful impacts of bullying victimization in boys. In girls, presence of meaning mediated victimization and online game addiction, suggesting that less meaning could explain how victimization led to online game addiction (28). Another study on Chinese college students showed that presence of meaning and self-esteem partially mediated the effect of impulsivity on Internet addiction (29). In other words, increased meaning in life plays a protective role in the development of Internet addiction, especially in impulsive individuals.

Although neither smartphone nor Internet addiction is included in behavioral addictions, obsessive–compulsive spectrum disorders, or impulse-control disorders in the Diagnostic and Statistical Manual of Mental Disorders-5 (30) due to conceptualization disagreements and lack of definitional consensus, there is still a need for empirical studies to elucidate the true nature and risk factors of these entities in risk groups including university students, who more tend to seek novelty and take risks compared to other age groups, especially when they live separately from their parents. Thus, in this study, we aimed to explore the differences between problems related to smartphone- and computer-based Internet use and investigate the correlations of these two types of addiction in university students. We examined the associations between psychological health indicators (depression, anxiety, stress) and the meaning in life dimensions (presence of meaning and search for meaning) and attempted to gauge the predictive utility of these measures for the two entities.

MATERIALS AND METHODS
Participants and procedure

Voluntary participants were recruited through convenience sampling from two universities (the Afyon Kocatepe University—AKU and the Afyonkarahisar Health Sciences University—AHSU) in the city of Afyonkarahisar, Turkey. All instruments were administered in regular classroom environment by trained members of the Yeşilay Club. Participants were orally informed about the study, and the administration of the instruments generally took 20–25 minutes. The data collection period started in December 2019 and

Table 3. The standard multiple regression analyses for Internet and smartphone addictions

Measures	Internet addiction				Smartphone addiction			
	b (SEb)	Beta(β)	t	p	b (SEb)	Beta(β)	t	p
Sex	0.65 (0.14)	0.18	4.505	0.000***	0.02 (0.014)	0.07	1.759	0.079
Presence of meaning	-0.02 (0.01)	-0.05	-1.204	0.229	-0.01 (0.01)	-0.04	-0.804	0.422
Search for meaning	0.04 (0.01)	0.18	4.526	0.000***	0.04 (0.01)	0.18	4.496	0.000***
Depression	0.70 (0.30)	0.15	2.313	0.021*	0.07 (0.03)	0.15	2.246	0.025*
Anxiety	0.34 (0.28)	0.07	1.190	0.234	0.02 (0.03)	0.05	0.755	0.451
Stress	1.44 (0.36)	0.26	4.031	0.000***	0.13 (0.04)	0.25	3.751	0.000***
R	0.53				0.47			
R²	0.28				0.22			
ΔR²	0.27				0.21			
F (6,476)	30.567***			0.000***	23.011***			0.000***

Females were coded as 1 and males were coded as 2.
* p<0.05
** p<0.01
*** p<0.001

ended in February 2020, due to the COVID-19 regulations put into effect throughout Turkey. As a result, we could reach a smaller portion of the students than we initially expected, particularly in the AHSU (35.8%), and only a total of 491 students (106 from the AHSU and 385 from the AKU) completed the questionnaires.

Measurements

Sociodemographic form: It was prepared by the authors and included basic questions about age, sex, marital status, department/faculty, financial status, parental characteristics, and general social life (club memberships, sports activities, artistic interests, etc.).

The Fagerström Test for Nicotine Dependence (FTND): The 8-item Fagerström Tolerance Questionnaire was developed in 1978 for the measurement of physical dependence on nicotine (31) and had subsequently been reduced to 6 items to address psychometric weaknesses (32). Scores ≥4 indicate presence of addiction and scores ≥7 indicate strong addiction. It has satisfactory reliability and validity coefficients (32,33). Its Turkish adaptation (34) displayed similar properties with a Cronbach alpha coefficient of 0.56 (0.63 in the present study).

The Meaning in Life Questionnaire (MLQ): It is a 10-item self-report questionnaire ranging from 1 (absolutely untrue) to 7 (absolutely true), designed for the measurement of the two dimensions of meaning in life: presence of meaning (MLQ-P: the extent to which people think and feel their lives are meaningful) and search for meaning (MLQ-S: the extent to which people search for more meaning) (18). There are 5 items for each dimension, with scores ranging from 5 to 35. The Cronbach alpha coefficients for MLQ-P and MLQ-S were reported as 0.86 and 0.87, respectively. In its Turkish adaptation (35), the same values were reported as 0.83 and 0.87, respectively (0.79 and 0.89 in the present study).

The Internet Addiction Test (IAT): It is a 20-item self-report questionnaire ranging from 1 (never) to 5 (always), developed for the measurement of general characteristics of addiction, including compulsive use (36,37). The Cronbach alpha coefficient was calculated as 0.89 previously (37) and 0.90 in the Turkish adapta-

tion by Bayraktar (38). The cut-off score for presence of addiction was reported as 50; however, only total scores were used within the scope of the present study and the Cronbach alpha coefficient was calculated as 0.94.

The Smartphone Addiction Scale (SAS): It is a 33-item self-report questionnaire ranging from 1 (definitely no) to 6 (definitely yes), developed by Kwon et al. (39) based on Young's Internet addiction test (33) for the measurement of risky behavior in smartphone use. Higher scores indicate a higher risk of smartphone addiction. No cut-off score was reported. There are 6 subscales in the original instrument and 7 in its Turkish adaptation. The Cronbach alpha coefficient was calculated as 0.96 previously, 0.95 in the Turkish adaptation performed by Demirci et al. (40), and 0.95 in the present study.

Depression–Anxiety–Stress Scale Short-Form (DASS-21): It is a 21-item self-report scale ranging from 0 (never) to 3 (always), derived from the 42-item DASS developed by Lovibond and Lovibond for the assessment of anxiety, depression, and stress symptoms, with 7 items for each (41). As suggested, the summed scores for each subscale are multiplied by 2 in order to make them comparable to the DASS normative data scores. The Cronbach alpha coefficients for anxiety, depression, and stress were respectively calculated as 0.84, 0.91, and 0.90 previously (42); 0.66, 0.68, and 0.61 in the Turkish adaptation by Sarıçam (43); and 0.84, 0.86, and 0.84 in the present study.

Finally, the smartphone scale used in the present study did not include any cut-off value for addiction presence or severity; and as our scope did not include finding any group difference based on addiction severity, the terms "addiction", "pathological use", and "problematic use" were used interchangeably.

Statistical analysis

All statistical analyses were performed using the Statistical Package for Social Sciences (v. 22.0 for Windows). Descriptive statistics were calculated for all continuous and categorical variables, except for the FTND scores not taken into analysis because only less than half of the participants reported that they smoked cigarettes. The Pearson product–moment analysis was

performed to examine the relationships between the variables. As there have been a very limited number of studies on the role of the meaning in life dimensions in smartphone and Internet addictions, standard multiple regression analyses were performed to determine the risk and protective factors for both addictions. Prior to all analyses, all scores were investigated for the assumptions for multiple regression, including normality, outliers and multicollinearity; and all were found to be satisfactory.

Study ethics

The study protocol was approved by the institutional review board of the Afyon Kocatepe University (18.04.2019-67).

RESULTS

The study included a total of 483 (317 females, 166 males) participants, with a mean age of 21.71±1.75 (range: 18–32) years. Most participants were from the AKU (78.9%), were studying at the faculty of science and letters (38.8%), were third-grade students (39.3%), had a grade point average of 2.51–3.00 (45.6%), were single (96.9%), were living in the state dormitory (40.8%), were currently not working (86.5%), and had a monthly income of 500–1000 TL (53.3%). The fathers of the participants were mostly elementary (29.7%) and high (26.3%) school graduates while the mothers were mostly elementary school graduates (46.2%). In 48% of the participants, monthly family income was between 2000 and 4000 TL. Most of all participants reported that they did not regularly attend any sports game or activity (78.1%), that they were not involved in any artistic or creative activity (82.6%), and that were not a member of any club in the campus (73.5%). The rate of non-alcohol substance use was 2.7%. Of all participants, 37.5% reported cigarette-smoking, of whom 15.5% was found to be addicted based on the FTND cut-off score. Participant sociodemographic characteristics are summarized in Table 1.

In terms of Internet addiction, 20.1% of participants had a greater score than 50, which is the cut-off score for Internet addiction. On the other hand, neither the original scale nor its Turkish version has a generally accepted cut-off score for smartphone ad-

diction, as mentioned previously. The Pearson product–moment analysis showed no correlation between age and smartphone and Internet addiction scores, the two meaning in life dimensions, and the DASS-21 depression, anxiety and stress subscale scores. Internet and smartphone addiction scores were highly correlated with each other (r=-0.79, p<0.001) and were both positively correlated with depression (r=0.43, p<0.001; r=0.39, p<0.001), anxiety (r=0.37, p<0.001; r=0.34, p<0.001), stress (r=0.45, p<0.001; r=0.42, p<0.001), and search for meaning (r=0.16, p<0.001; r=0.18, p<0.001), and negatively correlated with presence of meaning (r=-0.22, p<0.001; r=-0.20, p<0.001), respectively.

In order to investigate the role of the three psychological health indicators (depression, anxiety, and stress) and two dimensions of meaning in life (presence and search), two standard multiple regression analyses were performed for Internet and smartphone addictions. Since age was found to be uncorrelated with all variables, it was not included in the regression analyses. As can be seen in Table 3, findings showed that regression models and multiple regression coefficients were significant for Internet (R=0.53, p<0.001; F [6, 476]=30.567, p<0.001) and smartphone addictions (R=0.47, p<0.001; F [6, 476]=23.011, p<0.001). In terms of Internet addiction, the model explained 28% of the variance. Specifically, being male (β=0.18, t=4.505, p<0.001), search for meaning (β=0.18, t=4.526, p<0.001), depression (β=0.15, t=2.313, p<0.05), and stress (β=0.26, t=4.031, p<0.001) were significant predictors of Internet addiction. In terms of smartphone addiction, the model explained 22% of the variance. Specifically, search for meaning (β=0.18, t=4.496, p<0.001), depression (β=0.15, t=2.246, p<0.05), and stress (β=0.25, t=3.751, p<0.001) were found to contribute significantly to smartphone addiction.

DISCUSSION AND CONCLUSION

As expected, we found that both Internet and smartphone addiction scores were highly positively correlated with the two meaning in life dimensions and the three psychological health indicators of depression, anxiety, and stress. Being male, searching for meaning, depression, and stress were significant predictors

of Internet addiction while only searching for meaning, depression, and stress were significant predictors of smartphone addiction. Accordingly, our findings suggested that the two types of addiction were quite overlapping in nature except for their relationship with gender. This is consistent with previous studies reporting that male sex was correlated with computer-use Internet addiction (44–47), which could be explained by younger age at first use of the Internet, online gaming, watching videos with sexual content, and greater use of social media. Compared with smartphones, computers are more appropriate for online gaming, especially in the university campus where wireless Internet access is free and unlimited and where parental control is diminished. Also, virtual social interactions can provide a sense of identity and connection, contributing to the addictive use of these technologies.

Our findings also showed that both addiction types had common psychological properties, sharing the same predictors of depression, stress, and search for meaning. As mentioned above, a number of studies demonstrated that psychological health indicators, such as depression and anxiety, were the most common risk factors for both addictions (14,15,36,47,48). Although our findings failed to demonstrate the role of anxiety, depression and perceived stress are generally important factors in triggering Internet and smartphone abuse, especially in academic settings by their possible role in providing emotional regulation (49). Research on Turkish high school students found that 38% of the variance in Internet addiction and 19% of the variance in smartphone addiction were accounted for by emotional regulation strategies (50). In other words, students with low self-esteem or poor motivation as well as those fearing rejection or needing approval more often tend to abuse the Internet and smartphones in an effort to relieve or alleviate their negative emotions, including distress and depressive and suicidal feelings (36,51,52). However, in our study, anxiety was not found to make a significant contribution to either addiction, which is inconsistent with previous findings that both Internet and smartphone addictions were positively correlated with anxiety symptoms, especially when measured with the Beck Anxiety Scale (53–55). This unexpected finding might be related to the anxiety and stress subscale items in the DASS-21. For instance,

the DASS-21 anxiety subscale includes items more related to physical symptoms of state or situational anxiety (such as difficulty breathing, feeling of shakiness, trembling, feeling scared, and panic) rather than of trait or general anxiety, whereas the stress subscale focuses on chronic nonspecific arousal symptoms (irritability, being easily frustrated, upset or agitated, feeling touchy and impatient, difficulty calming down and tolerating, tendency to overreact). Physical symptoms of anxiety might not be linked to pathological Internet and smartphone use. Also, a systematic review of 23 peer-reviewed papers showed that depression was the most consistent finding with a greater effect size while anxiety was found to be a less consistent finding with small effect sizes (56). Future studies to measure trait anxiety would be more descriptive and exploratory in these addictions.

Our findings also suggested that only the search for meaning dimension was a significant predictor of both types of addiction. Surprisingly, some very limited but consistent data in the literature indicate that a sense of meaning in life, rather than search for meaning, has a negative relationship with Internet addiction (28,29,57,58). For instance, Ghaderi Rammazi et al. (58) found that presence of meaning was inversely associated with Internet addiction in university students while search for meaning showed no relationship at all. However, our finding makes sense theoretically or conceptually because search for meaning refers to an active process of search to make experiences comprehensible, worthwhile, coherent and valuable and an effort to have broader purposes that will provide a sense that one's life matters (18,19). It is an ambivalent/complicated but crucial process and might include asking basic but reflective questions about one's unique place in the world. Meaningful life is much more than mere existence or passive experience. Rather, it is an active examination of "one's life as a whole, making sense of it, infusing direction into it, and finding value in it" (19). Similarly, according to Frankl (59), life contains hidden meanings designed for everyone and one's true task is to discover or search for the meanings in their lives. Yet, this is a difficult and potentially frustrating process and this is why most people in modern times often have a sense of meaningless and feelings of depression and emp-

tiness, the alleviation of which is sought in material or hedonistic pleasures, which can lead to addictions. Frankl (59) stated that for modern people hedonistic pleasures functioned as a way of coping with boredom and meaninglessness. In this context, our finding suggests that those who lack meaning or need higher meanings in their lives seem to spend more time on the Internet, perhaps looking for ways to reconstruct or restore the meaning in their lives. Since our focus in the present study was not on why and how individuals used the Internet, we did not ask our participants about their general or specific sources of meaning in life, but this could well be the subject of another study. Considering that Internet and smartphone additions were also associated with levels of depression and stress, it could be assumed that a significant portion of our participants had not been able to attain adequate meaning in their lives and tended to develop their addiction during the search for it. Also, the assistance to be provided to university students by school counselors or clinicians should probe the reasons why they lost their sense of meaning at the first place, which might include psychological traumas (60), and should encourage involvement in artistic, physical, and social activities.

Finally, the main limitations of our study should be noted. First, the size of the samples from both universities remained small with the disruption of the COVID-19 pandemic. The data collection period was terminated earlier than initially planned because, considering the increasing levels of anxiety and stress among students in the face of the COVID-19 outbreak, we thought that it would not be appropriate to continue data collection by using any online version of the instruments. Secondly, instead of the DASS-21 that we used, separate clinical instruments could be used for more precise assessments of the role of depression and anxiety in behavioral addictions. Lastly, cross-sectional study designs using the convenience sampling method always involves a problem of generalization, although we tried to avoid this by collecting data from different faculties and universities, together with the specification "in a sample of university students" in the study title.

In conclusion, to our knowledge the present study was a first study to demonstrate the relationships be-

tween smartphone and Internet addictions and depression, anxiety, and stress as well as the meaning in life dimensions in university students, of which depression, stress, and search for meaning were found to be significant predictors of both addictions. However, since it was a correlational study, it remains unclear whether the psychological entities investigated (depression, stress, and search for meaning) lead to Internet and smartphone addictions or vice versa (61). Future studies with longitudinal designs and a different focus on traumatic experiences and personal sources of meaning in life would help to better understand the nature of these pathologies in university students, who constitute a vulnerable risk group.

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