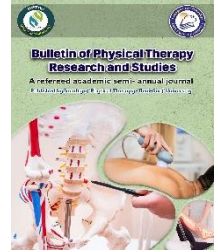




Bulletin of Physical Therapy Research and Studies

journal homepage: <https://bptrs.journals.ekb.eg/>

ISSN:



Correlation between smart phone addiction and pre-exam stress in BENI SUEF Physical Therapy students

Neveen B. Fayek , PT, M.S.c¹ , Nagwa M. Bader , PT ,PhD² , Heba M . Ali , PT , PhD³ , Salma I . AL-ghitany, PT , PhD⁴

¹ Cardiovascular /Respiratory Disorder and Geriatric, Faculty of Physical Therapy, Beni Suef University.

² Professor of Physical Therapy for Cardiovascular /Respiratory Disorder and Geriatric, Faculty of Physical Therapy, Cairo University.

³ Assistance professor of Physical Therapy for Cardiovascular /Respiratory Disorder and Geriatric, Faculty of Physical Therapy, Beni Suef University

⁴ Lecturer of Physical Therapy for Cardiovascular /Respiratory Disorder and Geriatric, Faculty of Physical Therapy, Cairo University.

Corresponding author:

Neveen B. Fayek ,

P.T., M.Sc., Faculty of physical therapy BENI SUEF university .

M.Sc. in Physical Therapy for Cardiovascular /Respiratory Disorder and Geriatric, Department of Physical Therapy for Cardiovascular /Respiratory Disorder and Geriatric, Faculty of Physical Therapy, Beni Suef University.

Email : [neveen. Boles1995@gmail.com](mailto:neveen.Boles1995@gmail.com)

Tel : (+20)1272016699

Running title : Correlation between smart phone addiction and pre-exam stress in BENI SUEF Physical Therapy students .

ABSTRACT:

University students are in the age group most interested in possessing smartphones for many different reasons. They use smartphones for a variety of activities such as studying, entertaining, accessing the internet and social communication. Despite the many benefits of smartphone use, empirical research suggests that individuals are addicted to or overly dependent on smartphones, resulting in negative consequences affecting their health and daily lives.

Keywords: smartphone, stress, gastrointestinal, cortisol.

Introduction:

The excessive, compulsive, uncontrollable use of a smartphone that results in a psychological dependence on the device (or the content on it) has been suggested as a possible sign of smartphone addiction. In addition, the removal of the phone or the inability to use it may cause withdrawal symptoms or extremely distressing feelings ⁽¹⁾.

Numerous surveys conducted over the last ten years have revealed a sharp increase in the number of smartphone users. Global smartphone adoption reached about 41.5% of the total population in 2019. The largest and fastest-growing category of smartphone users is young people (18–22 years old) ⁽²⁾.

Smartphones offer far more features than previous mobile phones, which were mainly used for texting and making calls. These features include web surfing, email, music, cameras, gaming, and a host of other applications. It is estimated that 7.8 billion people will own smartphones by 2028, up from the current 6.6 billion users globally ⁽³⁾.

The age group most interested in owning cellphones is university students, for a variety of reasons. Students utilize their smartphones for a range of purposes, including social networking, education, entertainment, and internet access ⁽⁴⁾.

Smartphone addiction (SPA) is thought to be one of the major contributing factors to health issues in people. In terms of physical health, SPA may cause discomfort in the hands and neck, and it may have an impact on sleep quality, which could result in poor self-control and bedtime postponement. Smartphone addiction and anxiety and depression are intimately associated ⁽⁵⁾.

Regarding the impact of smartphone addiction on various facets of health, in university students, smartphone addiction was found to be significantly positively correlated with depression and anxiety levels as well as subjective sleep quality, sleep disturbance, and daytime dysfunction ⁽⁶⁾.

All bodily systems, including the neurological, muscular, reproductive, gastrointestinal, endocrine, respiratory, and cardiovascular systems, are typically

impacted by stress. The speed at which food passes through the intestines is one way that stress can impact the gastrointestinal system. The way nutrients are absorbed by the intestines and digestion may also be impacted. Stress will cause activation of sympathetic nervous system, which in turn will cause the adrenal glands to become active ⁽⁷⁾.

The hypothalamic-pituitary-adrenocortical axis (HPA), the primary physiological mechanism that regulates the body's reaction to stress, can be impacted by stresses. The major hormone in the stress response system, cortisol, is one of the end products of HPA's regulation of endocrine hormone synthesis and release ⁽⁸⁾.

Although smartphones tried to make our lives easier and offered numerous advantages in the workplace, their addiction had detrimental effects on our health, including sleep problems, stress, anxiety, and a decline in wellbeing Thus, this study offers a novel look at the connection between smart phone addiction and pr exam stress in Beni Suef physical therapy students.

Material and methods:

Cross sectional Observational study design was conducted. The study protocol was approved by ethics committee of faculty of physical therapy Cairo university (P.T.REC/012/005084).

- Participants:

Sixty physical therapy students of both sexes were participated in this study. They were recruited from faculty of physical therapy BENI SUEF university. Their age ranged from 18-23 years old and Body mass index from 18.5 to 29.9. All students were be Smart phone users. we had excluded the participants That had psychological disturbances, use anti-depressant medications or any medications may affect the GIT and students having any history of GIT disease.

- **Procedure:**

These data were collected on the day of the exam and before its time. consent form was obtained from the students before data collection. Students were informed that their participation was completely voluntary, and they could decline participation at any time.

- **Outcome measures:**

1. Smart phone addiction scale short form

It is consisted of 10 items that caused by smartphone usage like missing planned work, hard time concentration, feeling pain, and so on. Each has 6 grades with higher score indicating higher smartphone addiction ⁽⁹⁾.

2. perceived stress scale:

It is consisted of 10 items which asks about feelings and thoughts during the last month, each has 5 grades from zero to 4 and the higher the score the much stress you have ⁽¹⁰⁾.

3. Gastrointestinal symptoms rate scale (GSRS)

Specific instrument of 15 items combined into five symptoms clusters (abdominal pain, depicting reflux, indigestion, constipation, diarrhea). each rated on a seven-point Likert type scale where the lower score represents the absence of troublesome symptoms and the higher one represents the very troublesome symptoms ⁽¹¹⁾.

- Cortisol level:

5mm blood sample had been drawn from a vein in the arm at 8 AM on the day of the exam. ELISA human kits (Roche, German) were used for measuring cortisol level in blood.

- Statistical analysis:

Descriptive statistics were used to describe the data as means \pm standard deviations. Pearson Correlation Coefficient was used to statistically analyze the correlation between the Smartphone Addiction Scale scores and each of Gastrointestinal Symptoms Rating Scale scores, Perceived Stress Scale scores, and cortisol hormone levels. The significance level was set at $P < 0.05$. The statistical analysis was done using Statistical Package for Social Sciences for Windows version 22 (SPSS, Inc., Chicago, IL)

Results:

- Participants' characteristics:

Sixty students were included in this study. They had a mean age of 21.76 ± 0.98 years, a mean body weight of 68.16 ± 11.42 kg, a mean height of 167.6 ± 8.8 cm, a mean body mass index of 24.23 ± 3.7 kg/m², a mean Smartphone Addiction Scale score of 35.61 ± 9.54 , a mean Gastrointestinal Symptom Rating Scale score of 34.88 ± 14.02 , a mean Perceived Stress Scale score of 21.73 ± 7.05 , and a mean cortisol level of 17.65 ± 5.62 mcg/dL, as shown in Table 1. The number of male students was 34 (56.67%), and the number of female students was 26 (43.33%), as shown in table 1 and Figure 1.

Table 1. Characteristics of participants

Students' characteristics (n=60)	Mean	Std. Deviation
Age (years)	21.76	0.98
Weight (kg)	68.16	11.42
Height (cm)	167.6	8.8
Body mass index (kg/m²)	24.23	3.7
Smartphone Addiction Scale score	35.61	9.54
Gastrointestinal Symptom Rating Scale score	34.88	14.02
Perceived Stress Scale score	21.73	7.05
Cortisol level (mcg/dL)	17.65	5.62

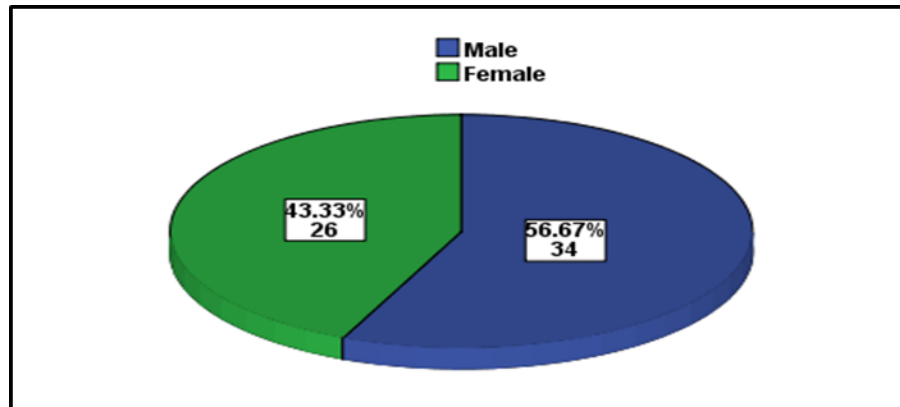


Figure 1. Gender distribution among study participants

The result of the present study showed a positive linear correlation between the Smartphone Addiction Scale and Gastrointestinal Symptoms Rating Scale scores ($r= 0.31$, $p=0.013$), as shown in Table 2 and Figure 2.

Additionally, no correlation was found between the Smartphone Addiction Scale and Perceived Stress Scale scores ($r=-0.078$, $p=0.552$), as shown in Table 3 and Figure 3 .and no correlation was found between the Smartphone Addiction Scale scores and cortisol levels ($r=0.114$, $p=0.385$), as shown in Table 4 and Figure 4.

Table 2. Correlation between Smartphone Addiction Scale and Gastrointestinal Symptoms Rating Scale scores

Correlation		Gastrointestinal Symptoms Rating Scale
Smartphone Addiction Scale	Pearson Correlation Coefficient (r)	0.31
	Significance (2-tailed p-value)	0.014*

	N	60
* significant p-value (p<0.05)		

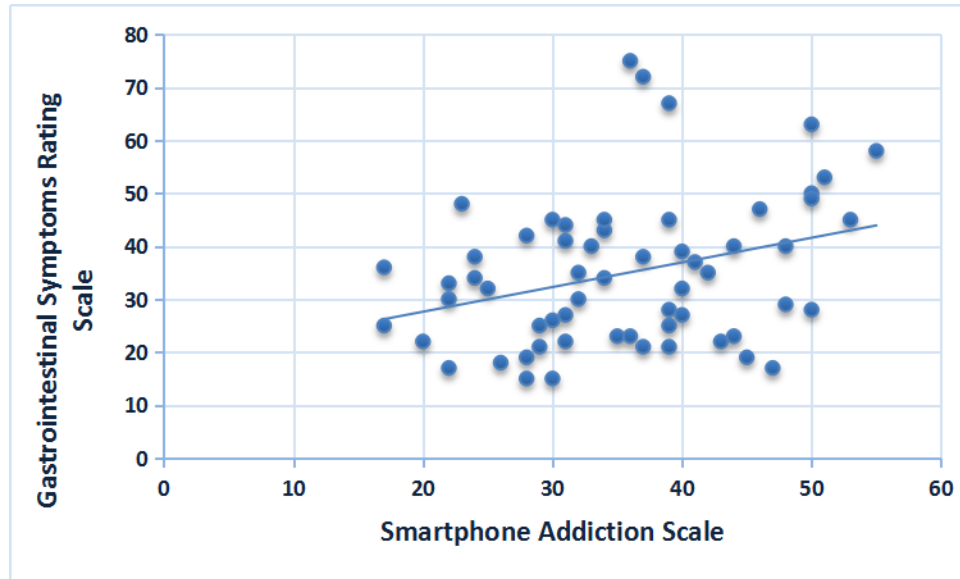


Figure 2. A Scatter plot for the correlation between Smartphone Addiction Scale and Gastrointestinal Symptoms Rating Scale scores.

Table 3. Correlation between Smartphone Addiction Scale and Perceived Stress Scale scores

Correlation		Perceived Stress Scale
Smartphone Addiction Scale	Pearson Correlation Coefficient (r)	-0.078
	Significance (2-tailed p-value)	0.552 ^{NS}
	N	60
^{NS} Non-significant p-value		

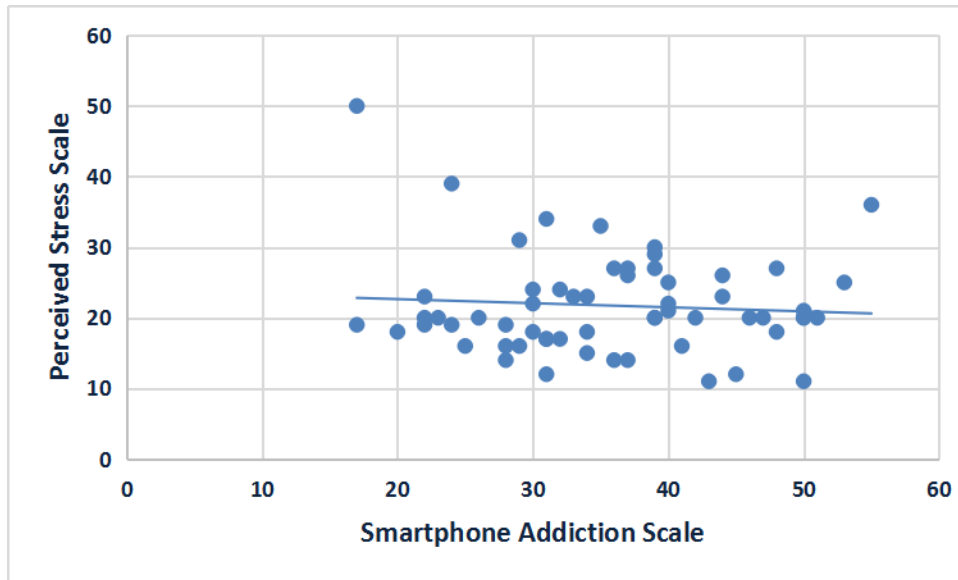


Figure 3. A Scatter plot for the correlation between Smartphone Addiction Scale and Perceived Stress Scale scores.

Table 4. Correlation between Smartphone Addiction Scale scores and cortisol levels

Correlation		Cortisol levels
Smartphone Addiction Scale	Pearson Correlation Coefficient (r)	0.114
	Significance (2-tailed p-value)	0.385 ^{NS}
	N	60
^{NS} Non-significant p-value		

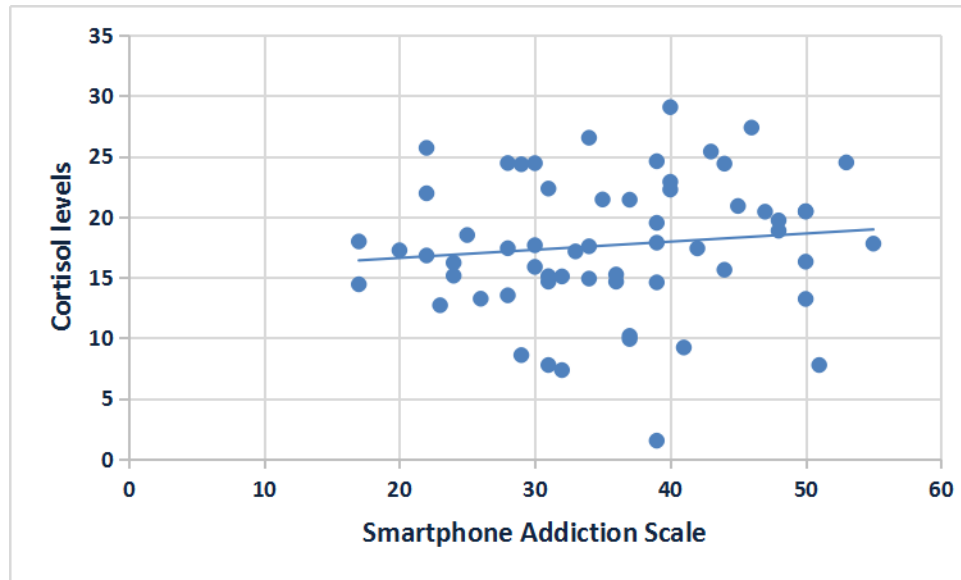


Figure 4. A Scatter plot for the correlation between Smartphone Addiction Scale scores and cortisol levels.

Discussion:

Finding a link between pre-exam stress and smartphone addiction is the primary goal of this research. The current study's findings indicated that there was no relationship between smartphone addiction and cortisol or stress, however there was a favorable association between smartphone addiction and gastrointestinal issues prior to exams.

The usage of smartphones has altered social behaviors. Family dynamics, daily routines, and social interactions. Constantly checking and/or using smartphone apps around-the-clock has been connected to a decline in physical

activity, poor academic performance, anxiety, stress, withdrawal, and sleep difficulties ⁽¹²⁾.

Regarding the correlation between smartphone addiction and gastrointestinal disturbances, the present study demonstrates a significant positive correlation between smartphone addiction and gastrointestinal disturbances. While the correlation between smartphone addiction and GIT disturbances was not strong in our study, there is still a noticeable association between the two factors.

The present study findings are in line with a previous study result which found association between smartphone use and functional gastrointestinal disturbances (FGIDs) prevalence in adolescents and returns this correlation to the effect of smartphone use on increasing consumption of unhealthy foods and sedentary behavior ⁽¹³⁾.

Similarly, prior study demonstrated that resilience and problematic mobile phone use (PMPU) are predictive of eating disorder symptoms in college students. Those who experience PMPU use their smartphones excessively, which can shorten their eating window and lead them to choose fast food or not eat at all. These behaviors increase the likelihood that eating disorder symptoms will manifest ⁽¹⁴⁾.

However, a previous study indicated that the quantity of social media platforms utilized had no effect on the intensity of stomach discomfort and other gastrointestinal symptoms in teenagers with functional gastrointestinal disorders (FGID). However, the authors' subgroup analysis revealed that the FGID group used excessive amounts of screen time in the reading, productivity, and entertainment categories compared to the controls, which was consistent with the current study's findings ⁽¹⁵⁾.

Also, a previous study indicated that Functional constipation is one of the gastrointestinal symptoms that results from loss of control and excessive internet use, which also leads to a sedentary lifestyle, delayed defecation, and increased food intake with poorer diet quality (eat smaller meals, have less of an appetite, skip meals, and snack more). These findings are consistent with our study ⁽¹⁶⁾.

Smartphone use's impact on a person's lifestyle and activities, such as their food, sleep patterns, emotional state, and physical activity, may help to explain how it affects gastrointestinal symptoms ⁽¹⁷⁾.

Our study findings suggest no correlation between smartphone addiction and pre-exam stress levels. This may be attributed to that Stress is a multifaceted concept that is impacted by numerous internal and external elements, such as

individual variations in coping mechanisms and social support ⁽¹⁸⁾, as well as self-efficacy perception ⁽¹⁹⁾.

Our study's findings can be explained by the fact that each student responds to stress in a different way, based on a variety of factors including psychological resources, personality types, emotional intelligence, social support, and institutional and curricular aspects in addition to prior experience ⁽²⁰⁾.

Even though smartphone addiction may have a major impact on overall wellbeing, it seems that a variety of factors other than technology use, such as poor study techniques, challenging exam formats, and negative thoughts, may also have an impact on pre-exam stress levels ⁽²¹⁾. Also, coping mechanisms used by people; some pupils use active coping mechanisms, while others employ avoidant ones. Coping is a crucial component of adapting to stressful life events ⁽²²⁾.

Moreover, the impact of smartphone use on stress levels may also be significantly influenced by the timing and duration of its use throughout the exam period ⁽²³⁾. Contrary to our study results, A pervious Correlation study showed that In medical college students, perceived stress was a risk factor for smartphone addiction and was positively correlated with smartphone addiction ⁽²⁴⁾.

Additionally, a pervious study found that College students' attachment to cell phones was positively correlated with their perceived stress ⁽²⁵⁾. Another

opposing study focused on the role of smartphone addiction as a coping mechanism for Students who are under a lot of stress revealed that using smartphone acts as a stress-relieving device when they are under stress ⁽²⁴⁾.

According to the compensating Internet use theory, people who feel that their circumstances are uncontrollable will need to use smartphones as a means of escaping or reducing their stress ⁽²⁶⁾. Additionally, a pervious study had shown that Some people get so dependent on their smartphone by providing a "security blanket" effect, which lowers the initial negative reaction to a stressor in a manner similar to that which happens with children and comfort objects like blankets ⁽²⁷⁾.

Regarding to the correlation between smartphone addiction and cortisol level the present study results indicated no correlation between them. A pervious study revealed that an enhanced cortisol awakening response has been linked to persistent psychological stress levels, including stress from a work or general life stress ⁽²⁸⁾. As perceives stress was not correlated to smart phone addiction in our present study, also the cortisol level was not correlated to it.

In contrast to our results, a pervious study indicated that, Due to smartphone addiction, low sleep duration and a late wake-up time were substantially correlated with elevated serum cortisol (SC) levels ⁽²⁹⁾.

The effects of smartphone addiction on our mental and physical well-being are numerous. The lack of a clear correlation between smartphone addiction and exam stress does not lessen the need to address problematic smartphone use; nevertheless, it does imply that tackling smartphone addiction alone may not be the most effective way to reduce exam stress. Alternative strategies like encouraging healthy digital habits, teaching efficient time management techniques, and offering social support or mindfulness training as a means of stress management should also be taken into account.

Limitation:

One of the study's limitations was its small sample size. also, Mobile phone type was not asked, resulting in a heterogeneous study population Another possible limitation is that the cortisol level was drawn through blood in our study and not from hair which is more accurate. Furthermore, larger follow-up studies, including more universities and smartphone addiction questionnaires are needed to confirm the findings of the present study.

Conclusion:

In summary, the present study results demonstrated that smartphone addiction is correlated to gastrointestinal disturbances while no correlation was found between

smart phone addiction and perceived stress. there are other factors that may affect pre-exam stress like psychological factors, students' self-esteem, time management, academic level and emotional factors.

References:

1. James, R. J., Dixon, G., Dragomir, M. G., Thirlwell, E., & Hitcham, L. Understanding the construction of 'behavior 'in smartphone addiction: A scoping review. *Addictive behaviors*. 2023;137: 107503.
2. Li, R., Li, T., Xie, Y., Zhai, S., Qu, Y., Zhang, D., ... & Tao, S. Smartphone Use and Inflammation at 2-Year Follow-Up in College Students: The Mediating Role of Physical Activity. *Psychology Research and Behavior Management*. 2023;16: 1509-1519.
3. He Z, Wu H, Yu F, et al. Effects of Smartphone-Based Interventions on Physical Activity in Children and Adolescents: Systematic Review and Meta-analysis. *JMIR Mhealth Uhealth*. 2021;9(2): e22601.
4. Achangwa, A. Ryu, H. Lee, J. Jang, J. Adverse Effects of Smartphone Addiction among University Students in South Korea: A Systematic Review. *Healthcare*, 2023;11(1): 14.
5. Qiu, H., Lu, H., Pei, J., Zhang, Y., Ma, Y., Xing, C., ... & Zhu, X. Effects of chronic stress on smartphone addiction: A moderated mediation model. *Frontiers in Public Health*. 2023;11: 1048210.
6. Sanusi, S. Al-Batayneh, O. Khader, Y. Saddki, N. The association of smartphone addiction, sleep quality and perceived stress amongst Jordanian dental students. *European Journal of Dental Education*. 2021;26 (1): 67-84.
7. Chu, B. Marwaha, K. Sanvictores, T. Ayers, D. Physiology, Stress Reaction .in StatPearls (Internet). Statpearl Publishing, 2022.

8. Smaliukienė, R., Bekesiene, S., Mažeikienė, A., Larsson, G., Karčiauskaitė, D., Mazgelytė, E., & Vaičaitienė, R. Hair cortisol, perceived stress, and the effect of group dynamics: a longitudinal study of young men during compulsory military training in Lithuania. *International journal of environmental research and public health*. 2022;19(3): 1663.
9. Kwon M, Kim DJ, Cho H, Yang S. The smartphone addiction scale: development and validation of a short version for adolescents. *PLoS One*. 2013;8(12): e83558.
10. Cohen, S. and Williamson, G. perceived stress in a probability sample of the United States. In S. Spacapan and S. Oskamp (Eds), *the social psychology of health*. 1998;31-67
11. Kulich, K. Madisch, A. Pacini, F. Piqué, J. Regula, J. Christo, J. et al. Reliability and validity of the Gastrointestinal Symptom Rating Scale (GSRS) and Quality of Life in Reflux and Dyspepsia (QOLRAD) questionnaire in dyspepsia: A six-country study. *SPRINGER NATURE*. 2008;6: 12.
12. Samaha, M., & Hawi, N. S. Relationships among smartphone addiction, stress, academic performance, and satisfaction with life. *Computers in human behavior*. 2016;57: 321-325.
13. Cinquetti, M., Biasin, M., Ventimiglia, M., Balanzoni, L., Signorelli, D., & Pietrobelli, A. Functional gastrointestinal disorders and smartphone use in adolescents. *Clinical and experimental pediatrics*. 2012;64(9): 494.
14. Li, S., Cui, G., Yin, Y., Tang, K., Chen, L., & Liu, X. Prospective association between problematic mobile phone use and eating disorder symptoms and the mediating effect of resilience in Chinese college students: a 1-year longitudinal study. *Frontiers in Public Health*. 2022;10: 857246.

15. Samuel, E., Lahiri, S., Hashmi, S., & Navarro, F. Social media use in adolescents with functional abdominal pain. *Frontiers in Pediatrics*. 2020; 8, 592972.
16. Çakar, S., & Eren, G. Internet addiction in constipated adolescents. *The Turkish Journal of Gastroenterology*. 2023;34(3): 287.
17. Lee, J. H. Does smartphone overuse affect functional gastrointestinal disorders? *Clinical and Experimental Pediatrics*. 2021;64(9): 471.
18. Alkhawaldeh A, Al Omari O, Al Aldawi S, et al. Stress Factors, Stress Levels, and Coping Mechanisms among University Students. *Scientific World Journal*. 2023;2023: 2026971.
19. Siddiqui, A. F. Self-efficacy as a predictor of stress in medical students of King Khalid University, Saudi Arabia. *Makara Journal of Health Research*. 2018;22(1): 1.
20. Gligor, Ş., & Mozoş, I. Indicators of smartphone addiction and stress score in university students. *Wiener klinische Wochenschrift*. 2019;131: 120-125.
21. Wadi, M., Yusoff, M. S. B., Abdul Rahim, A. F., & Lah, N. A. Z. N. Factors affecting test anxiety: a qualitative analysis of medical students' views. *BMC psychology*, 2022; 10(1): 8.
22. Al-Dubai, S. A. R., Al-Naggar, R. A., Alshagga, M. A., & Rampal, K. G. Stress and coping strategies of students in a medical faculty in Malaysia. *The Malaysian journal of medical sciences: MJMS*. 2021;18(3): 57.
23. Liu, S., Lan, Y., Chen, B., He, G., & Jia, Y. Smartphone Use Time and total screen time among students aged 10–19 and the effects on academic stress: a large longitudinal cohort study in Shanghai, China. *Frontiers in Public Health*. 2022; 10: 869218.
24. Wang, W., Yang, Y., & Yang, X. Perceived stress and smartphone addiction in medical college students: the mediating role of negative

-
- emotions and the moderating role of psychological capital. *Frontiers in Psychology*. 2012;12: 660234.
25. Kim, C., Kwak, K., & Kim, Y. The relationship between stress and smartphone addiction among adolescents: the mediating effect of grit. *Current Psychology*. 2023; 42(10): 8451-8459.
26. Vujčić, A., and Szabo, A. Hedonic use, stress, and life satisfaction as predictors of smartphone addiction. *Addictive Behaviors Reports*. 2022;15: 100411.
27. Panova, T., & Carbonell, X. Is smartphone addiction really an addiction? *Journal of behavioral addictions*. 2018; 7(2): 252-259.
28. Buselli R, Veltri A, Baldanzi S, et al. Plasma Brain-Derived Neurotrophic Factor (BDNF) and serum cortisol levels in a sample of workers exposed to occupational stress and suffering from adjustment disorders. *Brain Behav*. 2019;9(7): e01298.
29. Inoue, K., Hashioka, S., Takeshita, H., Kamura, M., & Fujita, Y. High serum cortisol levels as a potential indicator for changes in well-regulated daily life among junior high school students. *The Tohoku Journal of Experimental Medicine*. 2019;249(3): 143-146.