

## Osmangazi Journal of Medicine

e-ISSN: 2587-1579

### The Effect of Internet Addiction on Preoperative Anxiety in Adolescent

Ergenlerde İnternet Bağımlılığının Preoperatif Anksiyete Üzerine Etkisi

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**Abstract:** Internet addiction has been associated with mental health issues such as anxiety, sleep disorders, and depression in adolescents. However, its effects on preoperative anxiety have not been adequately studied. Our goal is to investigate the consequences of internet addiction on preoperative anxiety in adolescents undergoing surgery. The study was carried out by the approval of the Karatay University Ethics Committee at Konya City Hospital between August and December 2023. A total of 150 patients aged 12–18 who would undergo general anesthesia were included. Preoperative anxiety was evaluated utilizing the "Spielberger State-Trait Anxiety Inventory" (STAI-1), and internet addiction was assessed using the "Young Internet Addiction Scale" (IAS). Statistical analyses were performed using SPSS, and Pearson correlation, ANOVA, and regression analyses were used. It was found that 45.3% of the patients were internet addicts, and this group experienced higher levels of preoperative anxiety ( $r = 0.728$ ,  $p < 0.01$ ). Pairwise comparisons revealed statistically significant differences among all groups. We observed a strong positive connection between internet addiction and preoperative anxiety. Additionally, it was observed that age and easy access to the internet increased anxiety levels, with individuals having more accessible access to the internet experiencing higher anxiety levels compared to those with limited access ( $\beta = 0.189$ ,  $p = 0.018$ ). Internet addiction is an important factor that increases preoperative anxiety levels in adolescents undergoing surgery. Age and ease of internet access are other variables affecting anxiety levels. These findings suggest that internet addiction should be taken into account during preoperative processes.

**Keywords:** Internet addiction, Preoperative anxiety, Adolescents, General anesthesia

**Ethics Committee Approval:** This study was designed and conducted in accordance with the ethical guidelines set forth in the Declaration of Helsinki, and the study protocol was approved by the Karatay University Noninterventional Clinical Research Ethical Committee (Decision no: 2023/005, Date: 02/05/2023)

**Informed Consent:** This study did not require informed consent.

**Authorship Contributions:** 1. Conception - 2. Design - 3. Supervision - 4. Fundings - 5. Materials - 6. Data Collection and/or Processing - 7. Analysis and/or Interpretation - 8. Literature Review - 9. Writing - 10. Critical Review

Nuran AKINCI EKİNCİ: 1, 2, 3, 4, 5, 6, 7, 8, 9, Mehmet Akif YAZAR: 1, 2, 3, 7, 10, Aydın MERMER: 2, 7, 8, 10, Rabia KORKMAZ: 2, 5, 6.

**Copyright Transfer Form:** Copyright Transfer Form was signed by all authors.

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Financial Disclosure:** The authors declared that this study received no financial support.

**Received :** 13.11.2024

**Accepted :** 09.12.2024

**Published :** 30.12.2024

**How to cite/ Atf için:** Akıncı Ekinci N, Yazar MA, Mermer A, Korkmaz R, The Effect of Internet Addiction on Preoperative Anxiety in Adolescent, Osmangazi Journal of Medicine, 2025;47(1):85-90

## 1. Introduction

Anxiety, an unpleasant feeling of discomfort that leads to tension, worry, restlessness, and heightened autonomic activity, is a significant concern in the context of surgery. It is quite common among patients admitted for surgery, with preoperative anxiety related to anesthesia and surgery being a prevalent issue (1, 2, 3). This not only affects the mental state but can also lead to autonomic dysfunction, increased inflammatory response, decreased platelet activity, and postoperative pain, thereby negatively impacting both mortality and morbidity (1, 4, 5, 6, 7, 8). Patients experiencing high levels of anxiety require more anesthetic induction agents, and their postoperative recovery process is adversely affected (9, 10, 11).

In the last twenty years, the internet has been an essential aspect of life worldwide, significantly transforming critical areas like communication, information access, sharing, entertainment, and gaming (12, 13, 14). Notably, individuals born after 1995, Generation Z, have learned and internalized internet use at an early age (13, 15). However, uncontrolled internet use is defined as "internet addiction," and this addiction has detrimental effects on mental health, especially among adolescents (15, 16, 17). Adolescents, due to issues in social relationships, introversion, impulsivity, and communication problems, tend to turn to internet use, making them the most vulnerable group to screen addiction. The literature has explored relationships between screen and internet addiction and various mental health issues such as loneliness, anxiety, sleep disorders, depression, and suicidal tendencies (17, 18, 19, 20). However, it is clear that internet addiction among adolescents has a direct impact on their preoperative anxiety levels. In the study, we aimed to evaluate how internet addiction influences preoperative anxiety in adolescents preparing for surgery.

Our secondary goal was to determine if preoperative anxiety varies according to demographic factors. "Patients aged 12 to 18 y/o, scheduled for surgery with general anesthesia, had the psychical status of I-III under ASA (American Society of Anesthesiologists) physical status of I-III and had obtained informed consent from their parents."

## 2. Materials and Methods

This study was executed at Konya City Hospital between August 2023 and December 2023, with the

approval of the Karatay University Faculty of Medicine Ethics Committee (decision dated 02/05/2023, No. 2023/005). The study included 150 patients aged 12-18 who were scheduled for surgery under general anesthesia and classified in physical status of I-III vy ASA, had received consent from their parents.

### 2.1. Patient Selection

Inclusion criteria required the participants to be between the ages of 12 - 18 with an ASA I-III in addition to voluntary participation in the study. Exclusion criteria included patients who are younger than 12 or older than 18, those with an ASA status of IV or higher, cases requiring emergency surgery, patients scheduled for cardiac surgery, those with a history of psychiatric or mental illness, those using sedative or anxiolytic medications, and patients who were illiterate or did not speak Turkish.

### 2.2. Study Design

Before the study, all patients were informed about the general anesthesia they would undergo, and detailed explanations were provided. Demographic data were collected from patients who agreed to participate and recorded using a Sociodemographic Data Form. Preoperative anxiety levels were evaluated via the Spielberger State-Trait Anxiety Inventory (STAI FORM TX-1), and internet addiction was evaluated using the Young Internet Addiction Scale (IAS). The questionnaires were distributed to the patients, who were asked to complete them. The questionnaire was considered invalid if more than three questions were answered. Scoring was done manually, and patients' STAI and IAS scores were recorded in SPSS software. To maintain objectivity, the researcher who administered the questionnaire differed from the one who entered the data.

### 2.3. Measurements

The assessment of internet addiction was carried out through the Young Internet Addiction Scale, consisting of 20 questions, each of which is measured using a 5-point Likert scale (1 = Never, 5 = Always) with the highest possible score being 100. STAI FORM TX-1 is used to measure individuals' anxiety levels at a particular moment and consists of 20 items. The responses provided are rated on a 4-point Likert scale (1 = Not at all, 4 = Completely) with the total score ranging between 20 to 80, which

is interpreted as the higher scores corresponding to higher anxiety levels.

## 2.4. Statistical Analysis

In order to calculate the sample size, a Type I error rate ( $\alpha$ ) of 0.05 and statistical power ( $1-\beta$ ) of 0.95 were selected to identify the minimum number of participants needed for correlation analyses. The power analysis indicated a minimum sample size of 134 was necessary to detect a moderate effect. To account for potential data loss, the study included 150 patients.

Statistical analyses were carried out via the utilization of SPSS, version 22. The calculations included the mean and the standard deviation for the mean and standard for continuous variables and frequency and percentage values for categorical variables. Data normality was assessed through skewness, kurtosis values, and Z-scores, and differences between groups were analysed using One-way ANOVA.

To assess the main objective, Pearson correlation analysis was applied to calculate how internet addiction affects preoperative anxiety. This analysis

was carried out to evaluate the linear relationship and strength between the IAS and preoperative anxiety levels (STAI-1). The Pearson correlation coefficient ( $r$ ) was utilized to understand whether the two variables exhibited a positive or negative correlation, and determine its statistical significance. For the secondary objective, hierarchical linear regression analysis was conducted to observe whether preoperative anxiety varied according to demographic factors (e.g., age, gender, education level). This approach was selected to assess how much each demographic variable affected preoperative anxiety levels. The independent variables' effects on preoperative anxiety were identified using the regression model.

## 3. Results

The number of patients registered with the study was 150. The gender distribution was as follows: 57 (38%) were female and 93 (62%) were male. The sample ranged between ages 12 to 18 years with a mean age of  $14.98 \pm 2.1$  years. Thirty percent of the patients had undergone previous surgery. Descriptive demographic characteristics are illustrated in Table 1.

**Table 1.** Demography of the Participants

Characteristics		N	%
Gender	Female	57	%38,0
	Male	93	%62,0
Aged		14,8 $\pm$ 2,1	
Smoking	Yes	33	%22,0
	No	117	%78,0
ASA*	I	104	%69,3
	II	44	%29,3
	III	2	%1,3
Performed Surgery	Pilonidal sinus	28	%18,7
	Orthopedics	46	%30,7
	ENT	27	%18,0
	Plastic Surgery	1	%0,7
	Urology	18	%12,0
	Ophthalmology	13	%8,7
History of Previous Surgery	Diğer	17	%11,3
	Yes	45	%30
Internet Access	No	105	%70
	Easy	20	%13,3
	Moderate	61	%40,7
STAI**	Difficult	69	%46,0
	Low	38	25,3%
	Moderate	44	29,3%
	High	68	45,3%

Data are shown as mean,  $\pm$ SD, N (%). \*ASA: American Society of Anesthesiologists Classification, \*\*STAI-1: State-Trait Anxiety Inventory.

It was observed that the skewness and kurtosis values of the STAI-I and scores were within the range of  $\pm 1.5$ , and the Z-scores were below  $\pm 3.29$ , indicating a normal distribution.

### 3.1. Preoperative Anxiety Levels by Internet Usage Levels

Participants' levels of internet addiction were assessed using the Young Internet Addiction Scale

(IAS). The mean STAI-1 score for the average internet user group was  $34.30 \pm 7.87$ ,  $39.90 \pm 6.21$  for the at-risk internet users, and  $49.57 \pm 7.08$  for the internet addicts. These data are detailed in Table 2.

**Table 2.** Comparison of Internet Addiction Level and STAI-1 Scores

Group	N	Mean	Standard Deviation (SD)	95% Confidence Interval	P-value
Average user	20	34,30	7,875	30,61- 37,99	
Risky user	61	39,90	6,209	38,31-41,49	
Dependent user	69	49,57	7,087	47,86-51,27	<0,001

Post-hoc analysis of pairwise comparisons revealed significant differences between average and at-risk users, average and addicted users, and between at-risk and addicted users, with p-values of  $<0.006$ ,  $<0.001$ , and  $<0.001$ , respectively.

The fundamental purpose of the study was to examine the relationship between preoperative anxiety and one's internet dependency. Pearson correlation analysis signified a strong positive link between Young IAS score and preoperative anxiety (STAI-1 score) ( $r = 0.728$ ,  $p < 0.01$ ). This result demonstrates that as internet addiction increases, so does the level of preoperative anxiety.

Our subsidiary aim was to assess whether preoperative anxiety varied based on demographic factors. Hierarchical linear regression analyses were conducted in two stages for this purpose. In the first stage, only the internet addiction score was included as an independent variable. At this stage, the internet addiction score was found to significantly predict preoperative anxiety levels ( $\beta = 0.715$ ,  $p < 0.001$ ). In the second stage, demographic variables were included in the model. At this stage, the effect of the internet addiction score on preoperative anxiety persisted ( $\beta = 0.511$ ,  $p < 0.001$ ). In addition, age ( $\beta = 0.184$ ,  $p = 0.008$ ) and internet access status ( $\beta = 0.189$ ,  $p = 0.018$ ) also had significant effects on preoperative anxiety. Moreover, Variance Inflation Factor (VIF) values were checked in the multiple linear regression analysis to assess multicollinearity, and no multicollinearity was found.

After controlling for demographic variables, the effect of the internet addiction score on the STAI score decreased from 0.715 to 0.495, though the effect remained significant. The internet addiction score significantly accounted for 13.7% of the total

variance in the STAI score. According to the regression model controlling for demographic variables, a 1-unit increase in the internet addiction score significantly predicted a 0.277-unit increase in the STAI score. Similarly, a 1-unit elavate in the age variable predicted a 0.783-unit increase in the STAI score.

### 4. Discussion

Following the study measuring the impact of internet addiction on preoperative anxiety in patients aged 12-18 years undergoing general anesthesia, we discovered a robust positive correlation between the two with the rate of preoperative anxiety in the internet-addicted group being 49.57%.

In the digital age, there has been major attention drawn to concerns around the younger generation's addiction to the internet, with major links being made between internet usage and a variety of psychological issues such as sleep deprivation, depression, isolation and anxiety. Many studies in related literature confirm that addiction to internet affects the psychological health of adolescents, negatively. For example, studies by Tuncay and Üstündağ have observed a positive link associating higher internet usage with poor sleep quality, depression, and general anxiety in adolescents (19, 21). A study by Tsitsika et al. found that adolescents with internet addiction were 3.8 times more vulnerable to psychiatric ailments compared to healthy individuals (22). Studies like those by Dalbudak and Şimşek have also reported that internet addiction in adolescents increases psychiatric issues, manifesting in symptoms such as anxiety, attention deficit, and depression (17, 18). Our findings confirmed a strong positive link between internet addiction and preoperative anxiety

( $r = 0.728$ ), which is consistent with the findings of previous studies.

Various demographic factors influencing preoperative anxiety levels play an essential role in managing surgical processes. It has been observed that preoperative anxiety levels increase with age. This finding aligns with the literature, such as studies by Taşdemir and Peker, which reported that concerns about surgical processes increase with age and that age is a factor that heightens anxiety (23, 24). In the study, age was found to significantly increase one's vulnerability to preoperative anxiety following excessive internet usage.

In addition, internet access status also had a notable impact on anxiety. Individuals with constant internet access were monitored to suffer from higher levels of preoperative anxiety compared to those with limited access. This result aligns with findings in the literature that explore the connection between internet addiction and psychosocial issues. For example, studies by Şimşek and Younes have shown that internet access and usage increase anxiety and stress levels (18, 25). Particularly among young individuals, constant access to the internet can create psychological pressure and stress, leading to heightened anxiety in the preoperative period.

Some studies have reported that the sex of a participant has a more profound effect on their tendency towards developing preoperative anxiety (26), but our study found no such impact. This difference may stem from our study's focus on the adolescent population. In adolescents, social and

environmental conditions are known to be more influential than gender differences.

Despite precautions being taken, the study was still inhibited by several limitations. Firstly, since our study exclusively focused on 12-18 year olds, the results may not apply to adults or elderly populations, suggesting that the connection between internet addiction and preoperative anxiety may manifest differently in other age groups. Secondly, the data collection methods in the study were based on the method of self-reporting. STAI and Young IAS score were completed based on participants' self-reports. Such scales may be subject to bias stemming from social desirability or may not fully capture participants' conditions. Using more objective measures to assess psychological variables like anxiety and internet addiction could enhance the reliability of the results. Lastly, the cross-sectional model of the study renders it impossible to determine causal links; the temporal course of the effects of internet addiction can only be examined through a longitudinal study that follows participants over the course of many years.

In conclusion, this research observed that as internet addiction increased, preoperative anxiety levels also rose. Demographic factors such as one's age and ease of internet access were also observed to significantly impact anxiety levels. However, future research on larger populations with different demographic features will help bring us closer to a more comprehensive understanding of the topic surrounding internet addiction and the effect that it has on increasing the rates of preoperative anxiety.

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