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# THE EFFECTIVENESS OF INTERNET ADDICTION MOBILE APPLICATION ON SLEEP QUALITY OF INTERNET-ADDICTED STUDENTS

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## A B S T R A C T

Excessive internet use causes addiction leading to obsessive-compulsive behavior, depression, anxiety, juvenile delinquency, and sleep disorders. Poor sleep quality will reduce the ability to think, increase the risk of accidents, hormonal metabolism disorders during puberty and menstruation, excessive fatigue during the day, and impaired activities in work, school, and social functions. Internet addiction therapy is often carried out after complaints of severe symptoms such as social isolation, depression, and the risk of suicide. Patients must be hospitalized, which takes a long time and cost. Thus, developments are carried out to overcome the problem of internet addiction by preventing, screening, and intervening in internet addiction in a practical, effective, safe, and economical way using mobile applications. This study aimed to identify the effectiveness of internet-addiction mobile applications on internet-addicted students' sleep quality. A quasi-experimental using non-equivalent control group design with pre-test and post-test. The research instrument used was the Internet Addiction Test (IAT) and the Pittsburgh Sleep Quality Index (PSQI). This study used a consecutive sampling of 46 people for the intervention and control groups. Data were analyzed using the McNemar test. Internet-Addiction Mobile Application significantly improved sleep quality for students who experienced internet addiction (60,9%) experienced good sleep quality. Furthermore, Internet-Addiction Mobile Application can significantly reduce internet addiction (p-value = 0.04). Internet-Addiction Mobile Application effectively improves students' sleep quality who experience internet addiction. This information can be used as data to prevent and intervene in sleep quality problems in people with internet addiction.

## 1. INTRODUCTION

The internet provides convenience in daily activities such as communication, business, health, learning, and interaction, equipped with various interesting features causing users to waste time in front of computers or gadgets (Chao & Yu, 2017). Students use the internet more for entertainment facilities such as online and social games (Sari, Ilyas, & Ifdil, 2017) and doing assignments, especially during the COVID-19 pandemic because of online learning (Herliandry, Nurhasanah, Suban, & Kuswanto, 2020).

Kominfo (2021) reported that the total internet users in Asia reached 2.77 billion out of a total population of 4.33 billion, while Indonesia had 212.35 million or 76.8% of the total population (Kementerian Komunikasi dan Informatika (Kominfo), 2021). A survey in 2017 conducted by Asosiasi Penyelenggara Jasa Internet Indonesia (APJII) showed that 143.26 million people, or 54.68 % of Indonesia's population use the internet. The largest internet user was in the age group of 13-24 years (Kementerian Komunikasi dan Informatika, 2018). Excessive use of the internet leads to addiction problems. Based on a meta-analysis survey, the highest internet addiction occurs in the Middle East at 10.9% (Lau, Gross, Wu, Cheng, & Lau, 2017). Meanwhile, in Indonesia, 42.4% are addicted to the internet, and 70% of them access it, consisting of cybercrime, cyberporn, and online games for more than three hours per day (Rini & Huriah, 2020).

Internet Addiction (IA) is a person's inabilityo control the internet, causing physical, psychological, social, and academic problems with an average use of 38 hours or more per week (Kamaruddin, Nabila, & Qie, 2019). Internet Addiction (IA) is a mental disorder according to the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) as a reference for medical personnel to diagnose mental disorders (Kurniasih, 2017). Signs and symptoms of people experiencing internet addiction are psychomotor agitations, anxiety, depression, hostility, substance abuse, failure, loss of control, and reduced decision-making abilities (Çelebioğlu, Özdemir, Küçükoğlu, & Ayran, 2020).

Excessive internet use causes addiction leading to obsessive-compulsive behavior, depression, anxiety, juvenile delinquency, and sleep disorders (Nurhakim, 2021). Poor sleep quality will reduce the ability to think, increase the risk of accidents, hormonal metabolism disorders during puberty and menstruation, excessive fatigue during the day, and impaired activities in work, school, and social functions (Awasthi, Taneja, Maheshwari, & Gupta, 2020; Rohith, 2020).

Good sleep quality is useful for maintaining mental, emotional, memory, concentration, cognitive abilities, hormone secretion, and reducing stress (Evcılı Funda & Yurtsever Ilkay, 2018). Bad sleep quality in students causes a decrease in academic achievement (Jalali, Khazaei, Paveh, Hayrani, & Menati, 2020). Normal sleep duration at the age students is 7 to 9 hours a day (Chaput, Dutil, & Sampasa-Kanyinga, 2018).

Internet addiction therapy is often carried out after complaints of severe symptoms such as social isolation, depression, and the risk of suicide. Patients must be hospitalized, which takes a long time and costs. (Komisi Perlidungan Anak Indonesia (KPAI), 2018). Thus, developments are carried out to overcome the problem of internet addiction by preventing, screening, and

intervening in internet addiction in a practical, effective, safe, and economical way using mobile applications  (Yin et al., 2020).

One way to overcome mental health problems is with a mobile application. A study by Chandrashekar (2018) stated that Mobile apps have important capabilities for delivering effective psychological health interventions (Chandrashekar, 2018). Based on the data and phenomena above, this study aimed to investigate the effect of Internet-Addiction Mobile Applications on sleep quality and internet addiction.

## 2. METHOD

### Research Design

This study used a quasi-experimental non-equivalent control group design with pre-test and post-test. This study was carried out in August 2022 at Bhakti Kencana University. Pembangunan, Tarogong Kidul Garut City.

### Population and Sample

This study used purposive sampling on respondent meeting inclusion criteria, namely internet-addicted students with sleep disorders, students who have not received therapy for internet addiction and sleep disorders, and students who have smartphones. Meanwhile, the exclusion criteria were students on leave or drop out, and students left as respondents before the study was completed. Forty-six students nursing diploma program participated in this study which was divided into control and intervention groups, with each group consisting of 23 students.

### Intervention

Internet-addiction mobile application (Fig.1) is a mental health application in the form of screening, detection, or early diagnosis of internet addiction and sleep quality. The application provides education about preventing internet addiction and improving sleep quality with a schedule reminder feature based on Android at least version 4.0 or more, 1080 x 1920 pixels resolution, 2.96 GHz octa-core processor, and 6 GB RAM. The researchers made this application, and it cannot be downloaded via PlayStore.

### Instrument

Internet addiction was tested using Young's Internet Addiction Test questionnaire developed by Kimberly Young (1998) with 20 questions where each question has a minimum score of 0 and a maximum of 5. A score of 0-30 indicates normal internet use, 31-49 indicates mild internet addiction, 50-79 indicates moderate internet addiction, and 80-100 indicates severe internet addiction(Prasojo, Maharani, & Hasanuddin, 2018; Young, 1998). The diagnosis of sleep quality during the last month used the Pittsburgh sleep quality index (PSQI) developed by Buysse, Reynolds, Monk, Berman, and Kupfer in 1989. The PSQI questionnaire consists of 7 question components with a rating scale of 0-3. A person is said to have very good sleep quality with a score of 1-5, quite good with a score of 6-7, quite bad with a score of 8-14, and very bad with a

score of 15-21 (Çelebioğlu et al., 2020).

**Research Procedure**

All respondents were given informed consent before filling out the Young's Internet Addiction Test and the Pittsburgh sleep quality index (PSQI). If respondents experience internet addiction and sleep disorders, they will enter the control or intervention group. For the control group, respondents were only given health education. In contrast, in the intervention group, respondents were given an internet-addiction mobile application on a smartphone. Every day, the respondent would be reminded of the therapy schedule from the features in the application.

In the intervention group, education on the prevention of internet addiction and sleep quality was given to students, then listened to instrumentals for 60 minutes/day before going to bed for one week with the internet-addiction mobile application (Kavurmaci, Dayapoğlu, & Tan, 2019). Everyday, respondents will be reminded of the therapy schedule from the features in the application. Respondents were reminded 5 minutes before therapy and monitored in the internet addiction mobile application database. If they did, it would be recorded in the application database. The intervention was carried out for 60 minutes/per day before going to bed for one week.

**(a)** **(b)** **(c)**



**Data Analysis**

Data collection using a questionnaire, then the normality test was carried out, and the results of the data were non-normal distribution. Data were analyzed descriptively using a frequency distribution consisting of age and gender. The pre and post-tests used McNemar Test with significant results if $p < 0.05$. All the statistical analyses were carried out using SPSS 26 for

windows.

## Ethical Clearance

This study was approved by the Ethical Committee, Universitas Bhakti Tunas Husada with approval number: 185/ec.01/kepk-bth/VI/ 2022.

## 3. RESULT

Forty-six students were included in the intervention and control groups, each consisting of 23 students. Table 1 shows the characteristics of the respondents. Most respondents (19 respondents or 83%) were aged 20-24 years in the intervention group and (13 respondents or 57%) in the control group. In addition, almost all respondents (20 respondents or 87%) were women in the control group and (18 respondents or 78%) were women in the group.

**Table 1. Characteristics of Respondents (n = 46)**

| Characteristics | Intervention | | Control | |
|---|---|---|---|---|
| | F | % | F | % |
| Age | | | | |
|   15-19 years old | 4 | 17 | 10 | 43 |
|   20-24 years old | 19 | 83 | 13 | 57 |
| Gender | | | | |
|   Male | 5 | 22 | 3 | 13 |
|   Female | 18 | 78 | 20 | 87 |
| Total | 23 | 100 | 23 | 100 |

**Table 2. Internet Addiction Levels between Pre-test and Post-test (n=46)**

| Group | Internet Addiction Level | | | | p-Value |
|---|---|---|---|---|---|
| | Addiction | | No addiction | | |
| | F | % | F | % | |
| Intervention | | | | | |
|   Pre-test | 23 | 100 | 0 | 0 | 0.04 |
|   Post-test | 14 | 60.9 | 9 | 39.1 | |
| Control | | | | | |
|   Pre-test | 23 | 100 | 0 | 0 | 0.63 |
|   Post-test | 18 | 100 | 5 | 0 | |

Table 2 shows a significant difference between the level of internet addiction before and after being given the Internet Addiction Mobile application p=0.04 ($\alpha<0.05$). Table 3 shows a significant difference between the quality of sleep before and after being given the Internet Addiction Mobile application p=0.00 ($\alpha<0.05$).

**Table 3. Sleep Quality between Pre-test and Post-test (n=46)**

| Group | Sleep Quality | | | | p-Value |
|---|---|---|---|---|---|
| | Good | | Bad | | |
| | F | % | F | % | |
| Intervention | | | | | |
|   Pre-test | 23 | 100 | 0 | 0 | 0.00 |
|   Post-test | 15 | 60.9 | 8 | 39.1 | |

| Control | | | | | |
|---|---|---|---|---|---|
| Pre-test | 23 | 100 | 0 | 0 | 0.25 |
| Post-test | 3 | 100 | 20 | 0 | |

## 4. DISCUSSION

### Internet Addiction Level

This study found that 20-24 years old teenagers experience internet addiction the most. This is in line with a study by Hassan, Alam, Wahab, & Hawlader (2020) stated that most teenagers experience internet addiction at the age of 19-24 years, while Lozano-Blasco et al., (2022) revealed that in Bangladesh, internet addiction is often experienced by teenagers aged 23-24 years.

This study also found that women are more often addicted to the internet. In contrast, a study by Su et al. (2020) concluded that men experience internet addiction more than women. Men experience internet addiction due to internet gaming disorder (IGD), while women are due to social media addiction (Su, Han, Yu, Wu, & Potenza, 2020). In the faculty of nursing, there are more female than male students, thus affecting the number of samples based on gender.

Internet-addiction mobile application significantly decrease the internet addiction level (p=0.04). The internet-addiction mobile application contains information on preventing internet addiction by providing health education. According to Vondráčková & Gabrhelik (2016) the patient must have a favorite activity or hobby, do one day to get away from gadgets and everything related to the Internet, exercise, increase direct interaction with people around especially with family, seek entertainment in the real world, reduce online duration gradually, and reset online priority (Trahan et al., 2018).

### Sleep Quality

*Internet*-addiction mobile application significantly improved the sleep quality of internet-addicted students (p = 0.00). This is in line with a meta-analysis study of randomized controlled trials by Firth et al. (2017) that mental health interventions through mobile applications on smartphones are significantly effective, practical, and safe in overcoming mental health problems. In addition, Quanbeck et al. (2018) stated that the mental health mobile application for addiction therapy gets support from nurses and the community so that it will speed up patient recovery and make the cost more economical. The advantage of mobile applications is that they make it easy for users to get information portable without using a PC or netbook to obtain the latest information without being limited by time and place (Vaghefi & Tulu, 2019). The internet-addiction mobile application contains a schedule that automatically reminds students every 5 minutes before therapy. This feature can improve time management (Simmons, Crook, Cannonier, & Simmons, 2018)

Good sleep quality is useful for maintaining mental, emotional, memory, concentration, cognitive abilities, hormone secretion, and reducing stress (Evcılı Funda & Yurtsever Ilkay, 2018). Bad sleep quality in students causes a decrease in academic achievement (Jalali et al., 2020). Normal sleep duration at the age of students is 7 to 9 hours a day(Chaput et al., 2018). One of the main causes of decreased sleep quality is excessive internet use (Kokka et al., 2021). This problem is caused by the use of electronic devices where the brightness of the light projecting onto the eye's retina can trigger changes in sleep patterns and quality (Maulida & Sari, 2017). Sound and light from gadgets affect melatonin secretion, disrupting individual sleep rhythms, delaying sleep, shortening the time remaining for sleep, and disrupting sleep quality by causing periodic awakenings during sleep (Ercan et al., 2021).

Internet-addiction mobile application contains therapy to improve sleep quality consisting of instrumental music therapy and education about internet addiction and sleep quality. This decreases the body's rhythm, causing a decrease in sympathetic nerve response and the hormone noradrenaline, making the body calmer and relaxed to improve sleep quality (Cordi, Ackermann, & Rasch, 2019). This is in accordance with therapy to improve sleep quality, given for 60 minutes/per day before going to bed within one week (Kavurmaci et al., 2019).

## 5. CONCLUSION

In conclusion, this study found that the internet-addiction mobile application may improve the sleep quality improvement of internet-addicted students. Internet-Addiction Mobile Application was effective in improving the sleep quality of internet-addicted students. This information can be used as data to prevent and treat the sleep quality of internet addicts.

## 6. ACKNOWLEDGEMENT

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