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Research Article

A MIXED STUDY OF TECHNOLOGY DEPENDENCE FROM THE PERSPECTIVE OF FIRST-YEAR MEDICAL STUDENTS

BİRİNCİ SINIF TIP ÖĞRENCİLERİNİN PERSPEKTİFİNDEN TEKNOLOJİ BAĞIMLILIĞI ÜZERİNE KARMA BİR ÇALIŞMA

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ABSTRACT

Objective: Significant technological advances in recent years have led to increased use of technological devices, which can foster repetitive behaviors and dependence on technology. Technology dependence warrants thorough examination due to its physical, social, and psychological effects. This study aims to present students' perspectives on technology dependence, including its definition, causes, adverse effects, and recommendations for prevention and treatment.

Materials and Methods: This mixed-method study employs a descriptive sequential design. The quantitative phase involved 203 out of 268 first-year medical students from Süleyman Demirel University. The quantitative component assessed students' reliance on technology and identified groups for qualitative research. In the qualitative component, 15 participants were divided into four focus groups. Semi-structured interviews were conducted using a phenomenological design, investigating addiction perceptions, examples, causes, negative effects, and suggestions. Data were thematically evaluated using MAXQDA 2020.

Results: The study identified various perceptions of addiction, including feelings of being trapped, being unable to quit, experiencing deficiencies, or being overly focused on specific activities. Examples of addiction included cigarettes, alcohol, caffeine, sugar/salt, narcotics, technology, interpersonal relationships, and gambling. Factors contributing to technology dependence were individual, social, environmental, and familial.

Conclusion: Dependence on technology has psychological, physical, and social consequences. Participants proposed personal, familial, and community-based solutions. The study proposed methods for preventing, treating, and rehabilitating technology dependence.

Keywords: Qualitative Research, Internet Addiction Disorder, Addiction Medicine

ÖZET

Amaç: Son yıllarda teknolojide önemli gelişmeler yaşanmakta ve teknolojik cihazların kullanımı artış göstermektedir. Bu durum, bireylerin davranışlarının tekrarına ve teknoloji bağımlılığının oluşmasına sebep olabilmektedir. Teknoloji bağımlılığı fiziksel, sosyal ve psikolojik etkileri sebebiyle derinlemesine incelenme gerektirmektedir. Bu tez çalışmasında öğrencilerin teknoloji bağımlılık durumlarını, öğrencilerin gözünden teknoloji bağımlılığının tanımını, bağımlılığa yönelten nedenleri, bağımlılığın olumsuz etkilerini, bağımlılığı önleme ve tedavi önerilerini ortaya koymayı amaçladık.

Materyal ve Metot: Çalışma; karma araştırma yöntemi olarak açımlayıcı sıralı desenle dizayn edilmiştir. Nicel kısımda örneklem Süleyman Demirel Üniversitesi Tıp Fakültesi dönem 1 öğrencileridir (203/268). Nicel kısımda öğrencilerin bağımlılık düzeyleri teknoloji bağımlılığı ölçeğine göre ortaya koyuldu ve nitel araştırmaya katılacak gruplar oluşturuldu. 4 odak gruptan 15 kişi nitel çalışmaya dahil edildi. Nitel kısımda fenomenolojik desen kullanılarak veriler derinlemesine görüşmeler yoluyla yarı yapılandırılmış görüşme formu kullanılarak elde edildi.

Araştırma soruları; bağımlılık algısını, bağımlılığa verilen örnekleri, teknoloji bağımlılığının nedenlerini, teknoloji bağımlılığının olumsuz etkilerini ve önerileri değerlendirmeye yönelikti. Verilerin analizinde ise MAXQDA 2020 kullanılarak veriler tematik kodlama yoluyla çözümlendi.
Bulgular: Araştırma sonucunda bağımlılık olgusunun; ayrı kalamama, takılı kalma, vazgeçememe, eksikliğini hissetme, kötü bir şey, sigara, bir şeyi yapmayı bırakamama, dizi, bir şeye daha fazla yönelme şeklinde tanımlandığı; bağımlılığa ilişkin verilen örneklerin ise sigara, alkol, kafein, şeker/tuz, uyuşturucu, teknoloji, insan, kumar bağımlılığı şeklinde olduğu belirlendi. Teknoloji bağımlılığına yol açan faktörlerin bireysel, sosyal, çevresel ve ailevi sebepler altında şekillendiği tespit edildi.
Sonuç: Teknoloji bağımlılığının olumsuz etkileri ise psikolojik, fiziksel ve sosyal etkiler başlıkları altında incelendi. Katılımcılar tarafından geliştirilen çözüm önerileri ise bireysel, ailesel ve kamusal öneriler temalarıyla sunuldu. Araştırma sonuçlarından yola çıkarak; teknoloji bağımlılığını önleyici, tedavi edici ve rehabilite edici birtakım öneriler ortaya koyuldu.

Anahtar kelimeler: Niteleyici Araştırma, İnternet bağımlılığı bozukluğu, Bağımlılık tıbbı

Introduction

Technology has advanced significantly in recent years, leading to a surge in the use of computers, tablets, and smartphones. These technological devices enable quick access to information and facilitate rapid connections between users, potentially having either positive or negative impacts on people's social and familial lives (1,2). Widespread use of technology can create a dependency on these tools for many individuals. Rapid advancements in technology often contribute to issues of overindulgence and dependency. Technology addiction can arise through repetitive habits such as playing online games, frequenting websites with sexual content, or forming new connections on social media (3-5).

Physicians, like members of other professional associations, play a crucial role in combating addiction. To effectively address addiction, medical students should receive education on this topic beginning in their first year of study. As future leaders in combating addiction, it is essential to educate medical students on this issue. As role models, doctors must also strive to avoid addiction. Preventing addiction among future medical professionals can shape cultural norms and lifestyles. Examining technology addiction among today's medical students is crucial, as they will become tomorrow's healthcare providers. This study aims to assess the extent of technology addiction among students and identify related themes, including students' perspectives on technology addiction, its causes, consequences, and recommendations for prevention and treatment.

Materials and Methods

This study was conducted online between May 2021 and June 2021 due to the COVID-19 pandemic. Ethical approval was obtained from the Clinical Research Ethics Committee of Süleyman Demirel University Faculty of Medicine (Approval No. 72867572-050.01.04-423, dated 30 December 2020). The study population consisted of 268 first-year medical students at Süleyman Demirel University. A total of 203

Figure 1. Study Population and Sample Size

Study Population: Süleyman Demirel University Faculty of Medicine students
↓
Sample: Süleyman Demirel University Faculty of Medicine, term 1 students (n=268)
↓
203 students (75.4%) were included in the quantitative part.
↓
15 students (7.3%) were included in the qualitative part.
↓
Included in the qualitative part:

Dependency Level	Total Number	Qualitative research Participants	%
Fully dependent	2	1	50
Quite dependent	10	6	60
Moderately dependent	65	4	6.1
Lowly dependent	65	4	6.1
Not dependent	2	0	0

students (75.4%) agreed to participate in the study. Participants completed a Personal Information Form and the "Technology Addiction Scale," and the findings were used to assess their levels of technology addiction.

The research was conducted using an exploratory sequential mixed methods design, incorporating both quantitative and qualitative approaches. A phenomenological design was employed to explore participants' lived experiences, aligning with a case study framework. The explanatory design, as defined by Creswell et al. (2003),

follows a sequential explanatory framework comprising two components: an initial quantitative phase, succeeded by a qualitative phase aimed at elucidating or enhancing the quantitative findings (6).

A Semi-Structured Interview Form, prepared by the researcher, was used to collect qualitative data during the interviews.

Data Collection Tools

The Personal Information Form consisted of 10 items designed to examine participants' demographic information, habits related to the use of technological devices, and the frequency of their device usage. This form was utilized to obtain data relevant to the objectives of the study.

Technology Addiction Scale (TAS): The Technology Addiction Scale (TAS) was developed in 2017 as part of a thesis by Fatih Aydın at Ankara University, Institute of Educational Sciences, under the supervision of Prof. Dr. Nurettin Şimşek (7). It includes the following subscales:

- Social Network Addiction (SNA)
- Instant Messaging Addiction (IMA)
- Online Gaming Addiction (OGA)
- Website Addiction (WA)

The Cronbach's alpha coefficients of the subscales were calculated as follows: IMA 0.806, SNA 0.786, OGA 0.897, and WA 0.861. Addiction levels were determined by calculating the arithmetic means, and the minimum and maximum levels of technology addiction were identified.

The TAS survey results guided the categorization of participants into five groups based on their levels of technology addiction. Once categorized, participants were randomly selected from each group using a predetermined order facilitated by software. Consent was obtained from selected individuals who volunteered to participate. Interviews were conducted using

the Zoom platform, with both video and audio recordings captured. Focus group interviews were originally scheduled with groups of four participants each. However, due to one participant opting out at the last minute, the final arrangement included four groups comprising a total of 15 participants. The researcher conducted all interviews personally, following appointments arranged with the participants.

Semi-Structured Interview Form: The Semi-Structured Interview Form consisted of five open-ended questions developed by the researcher to explore participants' perspectives on addiction and technology addiction in depth. The questions included:

1. What does addiction mean to you?
2. Can you give an example of addiction?
3. What are the reasons that lead you to addiction or excessive engagement with technology?
4. Are there any negative effects of technology addiction?
5. If so, what are they? What do you think should be done in the context of combating addiction?

Participants were informed that video and audio recordings would be conducted, their personal information would remain confidential, and their actual names would be anonymized as "interviewer." They were also informed that the interviews would last approximately one hour. Interviews were terminated upon reaching data saturation—when no new viewpoints or ideas emerged during the qualitative data-gathering process.

Qualitative Data Analysis

In line with the study's methodology, data redundancy was observed after the 15th participant, indicating that sufficient saturation had been achieved. Consequently, interviews were discontinued after the 15th participant. This study employed a "coding within a general framework" methodology. Audio and video recordings of each focus group interview were transcribed verbatim, with careful attention given to participants' emotions and facial expressions during discussions. The transcripts, totaling 47 pages and 19,368 words, were reviewed multiple times by three family medicine academic researchers to ensure accuracy and consensus. The transcripts yield a total of 47 pages and 19,368 words. The initial interview lasted 50 minutes, the subsequent interview lasted 45 minutes, the third interview lasted 42 minutes, and the fourth interview lasted 66 minutes, resulting in an average interview duration of 50 minutes. During data collection, transcription, and analysis, participants' real names were used to maintain the integrity of the data. However, after completing the analysis, their identities were anonymized using the term "interviewer." Alphanumeric coding was intentionally avoided to ensure participants were not dehumanized.

The transcription process utilized computer software capable of accounting for participants' moods and facial expressions. Following transcription, the data were analyzed through inductive thematic coding, with deductive reasoning applied to confirm the compatibility of emerging themes. To enhance reliability, multiple researchers used a "Data Workbook" to systematically evaluate thematic coding. The analysis was conducted using MAXQDA 2020 software, which facilitated the development of concept maps to identify connections related to "technology addiction."

Results

The quantitative component of the study included all first-term medical students from the Faculty of Medicine at Süleyman Demirel University (N=268). The qualitative component comprised a sample of first-term students from the same population who participated in focus group interviews.

Based on the results of the "Technology Addiction Scale," students were categorized into five groups according to their addiction levels: fully dependent, fairly dependent, moderately dependent, lowly dependent, and not dependent.

- Two students were classified as fully dependent; both were contacted, and one volunteered to participate in the focus group interviews.
- Among the ten fairly dependent students, six volunteered for the focus group interviews, while four additional interviews were conducted.
- From a group of 65 students categorized as moderately dependent and 124 students categorized as lowly dependent, four participants were selected for the focus group interviews. Selection was based on their scores, ensuring diversity in gender, age, and socioeconomic status.
- The two students classified as not dependent were unreachable, as they did not provide contact information.

A total of 15 participants were included in the focus group interviews, comprising seven males and eight females, with a mean age of 18.9 ± 2.1 years. During the grouping process, care was taken to ensure that participants' technology addiction levels were comparable within each focus group.

The sociodemographic characteristics of the participants, along with their internet usage durations, technology addiction levels, and interview durations, are presented in Table 1.

Table 1. Data of Participant Students

Code Name	Gender	Age	Internet Usage Duration (hours)	TAS Score	TAS Level	Interview Duration (minutes)
Interviewer 1	Male	21	≥ 7	82	Highly addicted	50
Interviewer 2	Female	17	≥ 7	74	Highly addicted	50
Interviewer 3	Male	21	3-4	84	Highly addicted	50
Interviewer 4	Female	18	≥ 7	78	Highly addicted	50
Interviewer 5	Female	19	≥ 7	76	Highly addicted	45
Interviewer 6	Female	18	≥ 7	74	Highly addicted	45
Interviewer 7	Male	20	3-4	99	Fully addicted	45
Interviewer 8	Female	20	≥ 7	56	Moderately addicted	42
Interviewer 9	Male	18	5-6	53	Moderately addicted	42
Interviewer 10	Male	20	≥ 7	61	Moderately addicted	42
Interviewer 11	Female	19	3-4	49	Moderately addicted	42
Interviewer 12	Female	19	≥ 7	43	Low addicted	66
Interviewer 13	Male	18	≥ 7	38	Low addicted	66
Interviewer 14	Female	18	3-4	48	Low addicted	66
Interviewer 15	Male	18	1-2	34	Low addicted	66

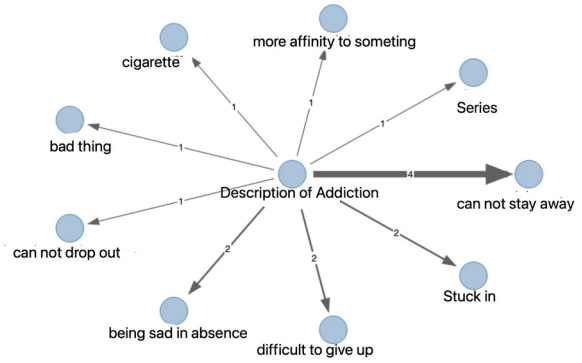
The concept maps generated from the interviews encompassed four main themes:

1. Definition of Addiction
2. Examples of Addiction
3. Reasons for Technology Addiction
4. Recommendations for Combating Technology Addiction

Each main theme was elaborated using detailed analysis and supported by direct quotations from participants. These quotations were integrated into the findings to provide depth and illustrate the themes. To ensure clarity and maintain confidentiality, the interview numbers of participants were indicated in parentheses following their responses (e.g., Interviewer 3).

Responses to Interview Questions:

What does addiction mean to you?



Participants' definitions of addiction included "inability to be separated," "being stuck," "inability to give up," "feeling of deficiency," "inability to stop doing something," "something bad," "smoking," "being more inclined towards something," and "TV series."

One participant described addiction as the "inability to function without it" (I11). Another elaborated:

"...I think addiction means that it doesn't leave our minds enough to affect our daily lives... After all, apart from living our lives freely, it is always in a corner of our minds, and we want to spend our time on it, apart from our responsibilities in daily life." (I12)

A third participant added:

"...When I hear the word addiction, it reminds me of the things that I feel incomplete without when I quit." (I6)

Technology addiction was a recurring focus during the interviews. Some participants associated addiction primarily with technology:

"I have never seen anyone around me addicted to drugs, so I immediately think of technology addiction." (I12)

"Although technology addiction is more prevalent, I have never witnessed anyone using substances." (I13)

Codes and themes were identified from participants' answers to "What are the causes of technology addiction?" According to the literature, participant data on addiction was divided into three categories: "Individual Factors," "Social and Environmental Factors," and "Family Factors."
Technology-specific theme Addiction has eight subsections: "Not finding fun"; "Feeling empty"; "Fear of missing out"; "Being happy on the Internet"; "Need to share"; "Expensive hobbies"; "Early Internet exposure"; and "Sense of competition".
"When I'm bored and have nothing to do, I use technology more." (I15) "At home, we struggle to find activities and rely heavily on technology and phones." (I11)

Participants claimed that their life was a large 'empty' that they filled with technical items because they couldn't find anything to replace it.

"…I'm getting bored because my life has become monotonous. You just sit and stand in front of the computer and there's nothing else to do. You can play TV shows, movies, and games as much as you want, but it doesn't work. I just sit in empty space." (I1)

"…Right now, we are alone at home, there is no one around, and no matter what we do, after a while, we fall into that void." (I3)
Participants who find their lives uninteresting and find satisfaction in watching people on the internet said, "It can be a boring life, I can't say anything in place of others, but for me, my life is pretty boring right now." (I8)

Participants also said that internet sharing speed has increased social media's influence.

Eight themes describe technology addiction's social and environmental factors: "Pandemic", "Asociality", "Communicating easily", "Discovering new worlds", "Keeping up with the environment", "Following the agenda", "Social phobia", and "Getting along better with virtual friends."

Causes of Technology Addiction
The most common answer to the question "What are the causes of technology addiction?" was the pandemic. Participants often stated that they were at home due to the COVID-19 pandemic and that they were more interested in technology due to limited opportunities.

Interviewee 4, who thought that she had no life left with the pandemic, mentioned that she spent her time by following events on the internet: "When the pandemic first started, I used to watch series regularly for 1-2 months. …But now the pandemic has progressed and it's like I don't have my own life, so I constantly follow events or current events on social media, I create something to think about during the day, like that."

Some participants stated that they tended to use technological devices more because they could not find an environment where they could socialize, thinking that they could stay away from technological environments by doing social activities.

Findings on the Negative Effects of Technology Addiction

Data on the negative impacts of technology addiction collected from participants were divided into three categories: "Psychological Effects," "Physical Effects," and "Social Effects." The topic of psychological effects included ten subsections: "Dissatisfaction," "Neglecting daily tasks," "Time loss," "Lack of concentration," "Academic underachievement," "Attributing failures to addiction," "Getting lost in other people's lives and missing one's own life," "Loss of self-confidence," "Getting easily bored," or "Failure to achieve goals." The physical consequences subject was divided into six sub-themes: "Eye problems," "Musculoskeletal problems," "Headaches," "sleep disorders," "Changes in body weight," and "Autism." The issue of social effects was divided into three sub-themes: "communication problems," "withdrawal from social activities," and "family conflicts."

Recommendations for Coping with Technology Addiction

Three main categories emerged for recommendations on managing technology addiction: Individual Recommendations, Family Recommendations, and Public Recommendations.

Individual Recommendations

Individual recommendations highlighted eleven sub-themes, including pursuing hobbies, deleting mobile applications or limiting usage time, socializing, allocating technology-free time intervals, keeping technological devices out of reach, setting personal goals, leading an active and organized life, seeking psychological support, using simpler, non-smartphone devices, and establishing a structured study routine.

Many participants reported that particular interests, such as testing new recipes, reading books, participating in sports, and adopting a pet, helped them limit screen time and stay involved offline. While these hobbies provided other ways to spend time away from screens, several participants, such as G7, expressed financial restrictions in following these interests, indicating a lack of affordable activities.

Strategies like removing or rearranging
mobile apps and consciously limiting screen time were regularly discussed. For example, G10 stated, "I silence and hide my phone while studying." To keep focus, I strive to remove distractions, including those from myself.

Family recommendations

The family-centered recommendations included eight sub-themes: parental supervision, delaying the introduction of internet use for children, quality family time, parents as role models, parental education on technology addiction, raising children's awareness of addiction, introducing hobbies to children, and avoiding imposing bans.

Participants underlined the need for parental involvement in monitoring their children's technology use. Observing children's internet activity under parental supervision was deemed critical for combating technology addiction. G12 stated, "I used my father's phone under his supervision. He tracked the websites I visited at the time." Some interviewees also suggested that family members temporarily hold electronic gadgets such as phones or tablets during study sessions to assist children in focus.

The concept of limiting children's exposure to technology received widespread approval, with some participants advocating that parents keep their children away from technology for as long as possible to reduce addiction dangers. For example, the G7 said: "Perhaps they can delay initial exposure to technology or limit social media usage as long as they can."

Quality family time was considered as a helpful strategy for preventing children's technology addiction. G9 offered an example of a family activity: "Families could read books together every evening at 9 p.m., which provides structured, tech-free time."
G9 shared an example of family activity: "Families could read books together every evening at 9 p.m., which provides structured, tech-free time."

Participants were also encouraged to start from a foundation of family awareness and openness. G6, for example, stated, "We are alone in our resistance to technology use. We need to address this from the source by creating more space, awareness, and responsibility among families and young people. Our parents should be part of this effort from the start."

A "sibling influence" was also noted as a positive

tool in raising awareness about the drawbacks of social media, with G13 remarking, "Criticism works for my sibling. I often pointed out the drawbacks of social media, even calling it pointless, and by the time my brother got a phone, he had no interest in social media."

While participants agreed on introducing hobbies to children, G6 cautioned against imposing strict bans, noting, "Prohibiting anything just makes it more appealing. It often has the opposite effect and fails."

Public Recommendations

Public proposals focused on boosting hobbies, education and awareness, expanding social activity areas, and encouraging sports. Many participants proposed that the government could help fund affordable hobbies and recreational activities. G12 expressed concern that economic constraints can impede the development of interests, stating, "Life is expensive, and we may struggle to pursue hobbies. Economic improvement may also help to reduce addiction. Some participants recommended mandatory extracurricular activities in schools to encourage pupils to pursue their hobbies. G15 stated: "American high schools often require club involvement

for graduation, which could be a way to reduce technology addiction by integrating hobbies into school systems."

Participants also identified technology addiction as an issue that is frequently overlooked, with G15 stating, "Begin by tackling this undervalued issue. It's a legitimate addiction, just like any other, and preventing one is far easier than stopping one. "Not starting is the best approach."

G15 also advocated for non-authoritarian public awareness campaigns, highlighting the importance of adult assistance.

Adults who want to break their internet addiction may not have family support, but social support can assist. Public programs could help addicts without pressuring them to give up social media or hobbies.

Additional social spaces were suggested because participants believed that having easy access to cinemas, theaters, and social activity centers would reduce screen time. G10 stated, "Public places should be freely accessible by foot or public transportation. "Access to social areas is important." G6 stated that the state should prioritize youth-oriented social venues. It would help us live a more balanced lifestyle."

Public recommendations preferred improved sports infrastructure. Additional sports facilities, bike lanes, pedestrian walkways, and sporting events were proposed. G2 commented: "The government could support sports by creating dedicated bike routes and pedestrian paths." G11 stated: "Publicly funded sports tournaments could increase interest in sports and provide a healthy outlet for people."

These multi-level proposals emphasized the importance of collaboration among individuals, families, and governmental organizations in reducing technology addiction and promoting healthy living.

Discussion

Technology addiction is spreading and needs proactive detection and treatment. First-year medical students' addiction knowledge, causes, effects, and prevention attempts were examined using interpretative phenomenological analysis. Students identified technology addiction as a behavioral dependency with preoccupation, mood swings, tolerance, withdrawal, and life difficulties like substance addiction. Addicts felt "stuck" with their devices and incapable of control.

Social, economic, and psychological factors affect technology addiction. Family issues, academic difficulties, social isolation, socio-economic constraints, and lack of options contribute. Easy online entertainment, stress management, procrastination, and a lack of quality in-person interactions or family time were regularly reported as addiction triggers.

Technology addiction is a big problem in modern communities, and like other addictions, it must be addressed. This study examines first-year medical students' technology addiction views holistically using interpretive phenomenological analysis. We explored addiction perception, instances, causes, effects, and prevention. As in our study computers, smartphones, and the Internet have risen rapidly, gaining popularity. Technology addiction produces obsession, emotional changes, tolerance, withdrawal symptoms, quitting issues, life problems, and loss of control (8).

Technology addiction promotes social disengagement, sleeplessness, and focus issues, especially
in youth. Screen time impairs cognitive and academic performance. Internet overuse reduces communication skills, social relationships, and family disputes in socially and developmentally sensitive children and young people (9). We found the same results according to the interviewers.

Technology Addiction Education That Works

1. Awareness in School Curriculums: Self-regulation in early schooling is important. Discussions in basic and secondary health and computer literacy programs can lay the groundwork. Universities and non-formal education institutions should provide first-year students workshops on the effects of excessive technology use during this crucial adjustment period.

2. Family Support and Parent Education Plans: Parents must learn technology exposure control for kids and teens. Co-using technology with kids, modeling balanced use, and tech-free family events assist. Families can set healthy digital boundaries with parental counseling (10).

3. Public awareness and hobby support: Government-supported initiatives can prevent excessive technology use and encourage balance. Public health initiatives should encourage sports and arts as affordable and alternative youth activities. Activities at youth centers with leisure and sports facilities can prevent technology overuse (11).

4. Digital Literacy Research and Development: Studying digital addiction behavior patterns will improve intervention approaches. Integrate mental health and counseling services into addiction treatment clinical methods for prevention and intervention (12).

Conclusion

More study is needed to understand and prevent tech addiction. Universities and other schools should encourage structured intervention. Government, education, and mental health must work together to fight digital addiction. To establish global best practices, academic institutions and public health initiatives should develop and test awareness and prevention pilot projects.

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