

ADDICTA

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Multidisciplinary work and ethical approaches in rehabilitation services

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Introduction

Addiction is a complex condition that affects not only individuals but also their families and society. For this reason, treatment and rehabilitation services require a multidimensional approach that extends beyond the scope of any single discipline. Multidisciplinary teams—comprising psychiatrists, psychologists, social workers, nurses, counselors, and family members—play a central role in effective addiction treatment and rehabilitation.

In Turkey, the Green Crescent Counseling Centers (YEDAM) exemplify rehabilitation approach through a holistic service model that integrates psychological counseling, social work support, family-focused interventions, and medical referrals when necessary. The coordinated efforts of different professional disciplines support both individual recovery and broader social reintegration. However, the effectiveness of this structure depends not only on technical expertise but also on strong ethical foundations. Principles such as confidentiality, autonomy, and justice are essential for sustaining trust and legitimacy in multidisciplinary rehabilitation services.

Within the Turkish context, the legal framework provides a critical basis for defining ethical and institutional boundaries in addiction services. Services delivered by YEDAM and similar institutions are governed by the Law on the Protection of Personal Data (KVKK), under which health data are classified as “special category personal data.” Accordingly, client information is protected through explicit consent, strict data security measures, and limited data sharing. Information exchange within multidisciplinary teams is conducted only to the extent required for service provision and within professional responsibility.

Although legislation may mandate reporting in cases involving serious risk to the individual or others, addiction treatment in Turkey is fundamentally based on voluntariness. The client's informed consent and active participation remain central, while compulsory interventions are limited to exceptional situations with clear legal justification and a focus on the

individual's best interest. Thus, addiction rehabilitation in Turkey is largely shaped by a rights-based, confidentiality-oriented, and voluntary framework.

The Importance of Multidisciplinary Work

A multidisciplinary approach addresses the biological, psychological, and social dimensions of addiction in an integrated manner.

- Medical dimension: Diagnosis, pharmacological treatment, and physical health monitoring.
- Psychological dimension: Individual therapy, group interventions, and motivational interviewing.
- Social dimension: Family support, educational and occupational integration, and social reintegration.

Rather than focusing solely on symptom reduction, this integrated model aims to enhance overall functioning and quality of life. Clear role definitions, shared treatment goals, and regular case discussions form the operational backbone of effective multidisciplinary collaboration.

At YEDAM, professionals from different disciplines work in coordination and maintain active collaboration with external institutions such as hospitals and social service agencies when necessary. This inter-institutional cooperation supports continuity of care and strengthens social integration, while strict attention to confidentiality ensures the protection of client trust throughout the process.

Ethical Approaches

Ethical principles are fundamental to the credibility and effectiveness of rehabilitation services.

- Confidentiality and privacy: Client information must be shared only with authorized parties and strictly within professional boundaries.

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- Autonomy and respect: Clients' decisions should be respected, and coercive practices should be avoided whenever possible.
- Justice: Equal and non-discriminatory access to services must be ensured.
- Benefit–harm balance: Interventions should be evaluated in terms of potential benefits and risks, with priority given to minimizing harm.

International standards further reinforce these principles. The American Society of Addiction Medicine emphasizes that addiction treatment should be guided by ethical commitments that prioritize autonomy, confidentiality, and justice (American Society of Addiction Medicine (ASAM), 2024). Similarly, effective multidisciplinary rehabilitation requires not only technical collaboration but also a shared ethical responsibility. Without principles such as confidentiality, autonomy, and justice, patient rights and dignity cannot be fully protected (Ohayon & Ronel, 2025).

Importantly, ethical sensitivity should not be limited to individual professional conduct; it must be embedded within institutional culture.

Ethical Challenges in YEDAM and Rehabilitation Institutions

Different service models in Turkey encounter distinct ethical challenges.

- Community-based services (e.g., YEDAM): Balancing client autonomy with family involvement and expectations is a central ethical concern.
- Residential or long-term rehabilitation settings: Issues related to autonomy, privacy, and power dynamics may become more pronounced, particularly when institutional rules conflict with individual preferences.

Additionally, fear of stigmatization and concerns about treatment records being included in official systems may reduce treatment adherence. These factors underscore the critical ethical role of confidentiality and privacy in sustaining engagement with addiction services (Akkaya et al., 2025).

Addressing these challenges requires systematic ethics training, institutional ethics committees, and regular professional supervision.

Conclusion

Addiction rehabilitation is not solely a clinical practice but also a field in which ethical responsibility, human rights, and social justice are actively realized. Multidisciplinary collaboration strengthens individual well-being by integrating biological, psychological, and social perspectives; however, its sustainability depends on a robust ethical and legal foundation. In community-based centers such as YEDAM, the protection of voluntariness, confidentiality, and autonomy is directly linked to public trust in services.

To enhance the quality of addiction services in Turkey, several policy-oriented steps may be taken. These include the development of standardized ethical guidelines for all professional groups involved in multidisciplinary teams and the integration of ethical decision-making modules specific to sensitive fields such as addiction into higher education curricula. Ethics education models that combine theoretical knowledge with case-based learning and supervision would further strengthen interdisciplinary collaboration.

At the national level, clearly defined and regularly updated ethical and professional standards for addiction rehabilitation services are needed to ensure consistency across public and non-governmental organizations while safeguarding client rights. Looking ahead, the expansion of inter-institutional collaboration, improvements in digital data security, and stronger community-based preventive strategies are likely to shape the future of addiction services in Turkey. Ultimately, the success of these developments depends on embedding ethical sensitivity as a core component of institutional practice, thereby promoting not only individual recovery but also social trust and cohesion.

Data availability statement

Data sharing is not applicable to this article as no new datasets were generated or analyzed during this study.

Conflict of interest

The author declares that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

- Akkaya, N., Akın, K., Aktürk, İ., & Yaman, Ö. M. (2025). Causes of drop out in substance use disorder treatment: A mixed-method study. *Addicta: The Turkish Journal on Addictions*, 12(3), 309-319. [Crossref]
- American Society of Addiction Medicine. (2024, April 3). Public Policy Statement on Medical Ethics in Addiction Medicine. <https://www.asam.org/advocacy/public-policy-statements/details/public-policy-statements/2024/04/07/public-policy-statement-on-medical-ethics-in-addiction-medicine>
- Ohayon, S., & Ronel, N. (2025). The moral voice in addiction and the self. *Journal of Substance Use and Addiction Treatment*, 170, 209624. [Crossref]

Interventions for adolescent digital addiction: A narrative review (2013–2023)

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Abstract

This narrative review examines the efficacy and scope of prevention and therapy interventions for digital addiction among adolescents. Through a systematic analysis of peer-reviewed articles published between 2013 and 2023, this review identifies effective strategies and highlights research gaps. Cognitive behavioral therapy emerges as the predominant intervention, often incorporating parental involvement. However, limitations include small sample sizes, lack of long-term follow-up, and the absence of software-mediated therapies specifically designed for adolescents. The review also underscores the need for more diverse study populations, as existing research is concentrated in a few geographic regions. Future research should explore technology-based solutions tailored to adolescent needs and extend study durations to enhance treatment outcomes.

Keywords: addictions to technology, adolescents, cognitive behavioral therapy, diagnostic tests, internet addiction, treatment outcome

Main points

- Cognitive behavioral therapy is the most commonly used and effective intervention for adolescent digital addiction.
- Parental involvement significantly enhances the success of intervention strategies.
- Long-term follow-up assessments are lacking in 40% of the reviewed studies, limiting the evaluation of sustained treatment effects.
- The absence of software-mediated interventions tailored to adolescents represents a significant research gap.
- Future research should explore interdisciplinary approaches and extend study durations to improve treatment outcomes.

Introduction

Digital addiction (DA) refers to an impulse control disorder related to obsessive and excessive use of digital devices, platforms, and technologies such as the internet, online platforms, video games, mobile devices, and social network platforms. It constitutes an emerging domain of Cyberpsychology (Singh & Singh, 2019).

The prevalence of digital devices nowadays has significantly influenced the behavioral patterns of adolescents, leading to increased concerns about DA. The prevalence of DA differs globally, varying between 8.90% in Eastern countries and 4.60% in Western countries (Pan et al., 2020); this discrepancy may be related to high demands for online activities and parenting attitudes toward Internet use (Griffiths et al., 2016). Recent studies indicate a rising trend in problematic

digital media use among adolescents, with reports showing an increase from 7% in 2018 to 11% in 2022, highlighting the potential risks for developing problematic behaviors related to video games (World Health Organization, 2024). At present, Internet Gaming Disorder (IGD) is recognized in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-V) (American Psychiatric Association, 2013). While IGD is officially recognized in the DSM-5 as a diagnosable condition, DA remains a broader and less clearly defined concept encompassing excessive engagement with digital devices, social media, and online platforms beyond gaming (Kuss & Lopez-Fernandez, 2016). The absence of a universally accepted classification for DA leads to inconsistencies in diagnostic criteria, making it difficult to assess its true prevalence and to develop standardized intervention strategies (Brand et al., 2020). Some researchers categorized DA as a non-substance-related impulse control disorder

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marked by compulsive use of digital media, characterized by an inability to control the usage despite understanding its negative consequences (Harscoet et al., 2013; Imrani & Touri, 2025; Meskini et al., 2024; Shapira et al., 2003; Şimşek et al., 2019; Young, 1998).

Prior research has primarily focused on DA prevention and treatment programs, with less emphasis on tailored interventions for adolescents (Bağatarhan & Siyez, 2017; Cemiloglu et al., 2022). This gap highlights the need for a dedicated review of age-specific intervention strategies and their efficacy. This narrative review aims to systematically examine and evaluate preventive and therapeutic interventions for DA in adolescents, differentiating it from other reviews by the critical evaluation of intervention methodologies and focusing on types of DA examined and screening instruments used for adolescents.

The primary objective of this review is to explore and compare the various approaches implemented to combat DA among adolescents, assessing their effectiveness and identifying gaps in the existing literature. The review draws on peer-reviewed journals from 2013 to 2023 using a structured research strategy.

This review addresses a critical gap in literature by focusing exclusively on interventions targeting adolescents, a population undergoing major developmental transitions and particularly vulnerable to digital overuse. While previous reviews have examined DA in the general population or focused primarily on IGD, this study provides a dedicated synthesis of interventions designed for adolescents across a broad spectrum of digital behaviors. The originality of the present review lies in its structured comparison of prevention and treatment approaches, its analysis of age-appropriate screening tools, and its emphasis on contextual factors such as school, family, and clinical environments. The findings of this study have practical implications for educators, clinicians, and mental health professionals seeking evidence-based guidance on how to address digital overuse among adolescents. They also offer theoretical value by identifying trends, gaps, and typologies in intervention design and evaluation, which can help shape future research frameworks in this emerging field.

Conceptual Background

Digital addiction among adolescents is increasingly understood as a complex behavioral phenomenon situated at the intersection of self-regulation deficits, emotional vulnerability, and maladaptive cognitive processing. Unlike substance-related disorders, DA involves excessive engagement with rewarding digital stimuli (e.g., social media, online games, or mobile applications) without a clear physiological substrate, making its mechanisms primarily psychological and behavioral. Several theoretical models support this view, converging on the idea that digital overuse functions as a coping mechanism for managing negative emotions and environmental stressors.

The Cognitive Behavioral Model is one of the most widely adopted, emphasizing the role of automatic thoughts and

dysfunctional beliefs in maintaining maladaptive behaviors (Beck, 1979). Cognitive behavioral therapy (CBT)-based interventions thus aim to correct these distorted cognitions, while also providing structured emotional regulation strategies and behavioral alternatives (Young, 1998).

Another relevant framework is the self-regulation theory (Carver & Scheier, 2001); maladaptive digital behaviors may result from impaired goal-directed control and an overreliance on short-term rewards. Adolescents, whose executive functioning and impulse control systems are still developing, are particularly susceptible to this imbalance. When emotional dysregulation is present, digital platforms may serve as a form of coping strategy based on avoidance. This aligns with Gross's model of emotion regulation (Gross, 1998), which posits that individuals seek external behaviors to modulate internal states when they lack effective cognitive strategies. In this context, DA becomes a reinforcing cycle: emotional distress leads to digital engagement, which provides temporary relief but ultimately exacerbates dependence and avoidance patterns. Teaching adolescents to recognize and manage their emotional states is thus considered a key target in both prevention and treatment of DA (Lindenberg et al., 2020).

Incorporating these dimensions, the theoretical framework guiding this review posits that DA arises from an interaction between individual vulnerabilities (e.g., impulsivity, affective dysregulation), environmental reinforcements (e.g., accessibility, peer norms), and cognitive distortions. Effective interventions, therefore, must be multidimensional: they should target not only the behavior itself but also the underlying emotional and cognitive mechanisms that drive it. This perspective supports a structured overview of existing therapeutic and preventive programs, highlighting their contextual diversity and general approaches while pointing to the need for deeper analysis of how they target the core mechanisms of DA.

Materials and Methods

Search Strategy

This review followed the PRISMA 2020 guidelines for reporting systematic and narrative reviews (Page et al., 2021). The PRISMA 2020 full checklist is provided as a supplementary file. As this is a narrative review synthesizing empirical studies and not a meta-analysis or clinical trial, no PROSPERO or OSF registration was conducted.

A comprehensive literature search was executed using several databases including ScienceDirect, PsycInfo, PubMed, and Scopus. The search aimed to identify empirical studies on interventions targeting DA among adolescents. The search terms were constructed around four conceptual components: the type of digital use, the nature of the disorder, the population, and the type of intervention. Especially, the Boolean operators used were (digital OR internet OR smartphone OR social media) AND (addiction OR compulsive) AND (adolescent OR youth) AND (treat* OR prevent* OR combat*). Search strings were tailored to the syntax of each database.

In PubMed, this research was applied in the "title/abstract" fields using both controlled vocabulary (MeSH terms) and free-text keywords. In Scopus, the query was formulated to include title, abstract, and keyword fields using the "TITLE-ABS-KEY" operator, with access obtained via institutional academic account. In Web of Science, the search was conducted using the "Topic" field, which encompasses titles, abstracts, author keywords, and Keywords Plus. In PsycINFO, subject headings and abstract fields were utilized to retrieve records relevant to psychological interventions. Finally, in ScienceDirect, keyword combinations were searched across full texts and abstracts within the health and psychology domains.

All searches were limited to peer-reviewed journal articles published in English and available in open access. The time frame was restricted to publications from 2013 to 2023, corresponding to the period leading up to the literature search. Search results were exported to Zotero reference manager, and duplicates were identified automatically and removed manually using Zotero's duplicate detection tool. Title and abstract screening were performed by two independent reviewers, with disagreements resolved through discussion.

Inclusion and Exclusion Criteria

Inclusion criteria encompassed studies that were (1) published between 2013 and 2023, (2) grounded in empirical evidence, (3) featured in peer-reviewed journals, (4) published in English, and (5) available as open-access resources. Conversely, studies were excluded if they (1) inadequately detailed the employed countermeasures, (2) failed to discuss the efficacy of the countermeasures, (3) pertained to participants outside the adolescent age bracket (12–18 years), (4) were conference abstracts, editorials, doctoral dissertations, reviews, theoretical papers, or case studies, and (5) revolved around gambling. Excluding gambling studies was due to the potential overlap between the terms "gaming" and "gambling" in the research literature. Additionally, the absence of a consensus on categorizing DA as a mental disorder, combined with the recent recognition of Gaming Disorder by the World Health Organization in the International Classification of Diseases, prompted the omission of Gambling Disorder from the search. This strategic decision aimed to prevent any distortion of the understanding of DA as a condition and the subsequent analysis of countermeasure efficacy.

Gray literature (e.g., reports, dissertations, non-peer-reviewed articles, and conference proceedings) was excluded to ensure the scientific rigor and reproducibility of the findings. Given the emerging nature of DA research, only empirical studies published in peer-reviewed journals were included, which meet the quality standards necessary to draw valid and generalizable conclusions.

Data Extraction

The database exploration took place on August 13, 2023. Data extraction was meticulously carried out from each selected study. The extracted information included:

- Country of study and study settings.
- Demographics of the study population (number of participants, age, gender).
- Specifics of DA behaviors.
- Diagnostic instruments used.
- Types of interventions implemented.
- Study designs and methodologies.
- Duration of interventions and follow-up periods.
- Outcomes measured and results obtained.
- Pre- and post-intervention means and baseline standard deviations for the relevant outcome measures, to allow effect size calculation.

This structured approach to data extraction ensured a comprehensive understanding of the interventions and their outcomes, facilitating a thorough synthesis of the existing literature.

Given the narrative nature of this review and the heterogeneity of study designs, no formal risk of bias assessment (e.g., using RoB 2 or JBI tools) was conducted. Instead, methodological strengths and limitations were discussed qualitatively in the Results and Discussion sections.

Data Analysis

The analysis focused on comparing the efficacy of different interventions, the extent of parental involvement, and the sustainability of outcomes over time. Special attention was given to the methodologies employed in these studies to ascertain the robustness of the findings and the applicability of the results across different settings.

Effect sizes were calculated using standardized mean differences, with the baseline standard deviation used as the denominator for within-group comparisons ($d = [M_{\text{follow-up}} - M_{\text{baseline}}] / SD_{\text{baseline}}$). This approach was selected to enable direct comparison across studies with varying designs, including both controlled and uncontrolled trials. Using the baseline standard deviation provides a consistent reference point representing natural population variability prior to any intervention, avoiding confounding effects from treatment-induced variance changes that may occur at follow-up assessments.

Although some studies reported multiple follow-up timepoints (e.g., 1, 4, and 12 months), effect sizes were deliberately calculated for each follow-up separately, rather than only the longest one, in order to highlight temporal patterns and observe whether treatment effects increased or decreased over time. This allowed us to detect a consistent trend across studies showing that treatment benefits tend to strengthen and become more pronounced at the 12-month follow-up.

Effect sizes were interpreted according to Cohen's conventions, where $d = 0.2$ represents a small effect, $d = 0.5$ a medium effect, and $d = 0.8$ or higher a large effect. To correct

for small sample bias, Hedges' g was computed by applying a correction factor to each Cohen's d value. This standardized procedure ensures methodological consistency across the diverse designs and outcome measures included in this review.

Results

The systematic search and selection process yielded a total of 402 studies initially, which were then screened based on titles and abstracts, resulting in 29 papers that were further assessed for eligibility. After examining the method and results, 19 studies were excluded as they were either study protocols, did not report results, or presented any exclusive criteria discussed below. As a result, 10 studies were included in this review. The selection process is illustrated in Figure 1.

Selected Studies

The selected studies have a significant impact within the academic community. All included studies, regardless of when they were published, provide valuable insights that drive ongoing discussions and developments in understanding DA among adolescents (Table 1).

Although only 10 studies met the inclusion criteria, this was not a deliberate limit but the actual outcome of a rigorous selection process. Despite the small number, thematic saturation was reached, as the studies consistently highlighted CBT as the main intervention and emphasized the importance of parental involvement. This convergence suggests that the data were sufficient to identify meaningful trends in adolescent DA interventions.

Experimental Approaches and Intervention Effectiveness

Out of the 10 studies analyzed, seven employed an experimental trial approach to explore the effectiveness of various interventions (Bong et al., 2021; Choi et al., 2020; González-Bueso et al., 2018; Kim et al., 2018; Kor & Shoshani, 2023; Nielsen et al., 2021; Torres-Rodríguez et al., 2018). Within this subgroup, four studies tested different countermeasures across multiple participant groups to assess their impact (Bong et al., 2021; González-Bueso et al., 2018; Nielsen et al., 2021; Torres-Rodríguez et al., 2018), while three studies focused on monitoring changes over time within a single group by comparing initial and follow-up data (Lee et al., 2016; Lindenberg et al., 2022; Szász-Janocha et al., 2021). Additionally, three of these experimental studies included control groups without interventions (Choi et al., 2020; Kim et al., 2018; Kor & Shoshani, 2023), which were crucial for evaluating the effectiveness of the countermeasures.

Study Characteristics

Most of the research was conducted in South Korea, with four studies originating from this country, followed by Germany

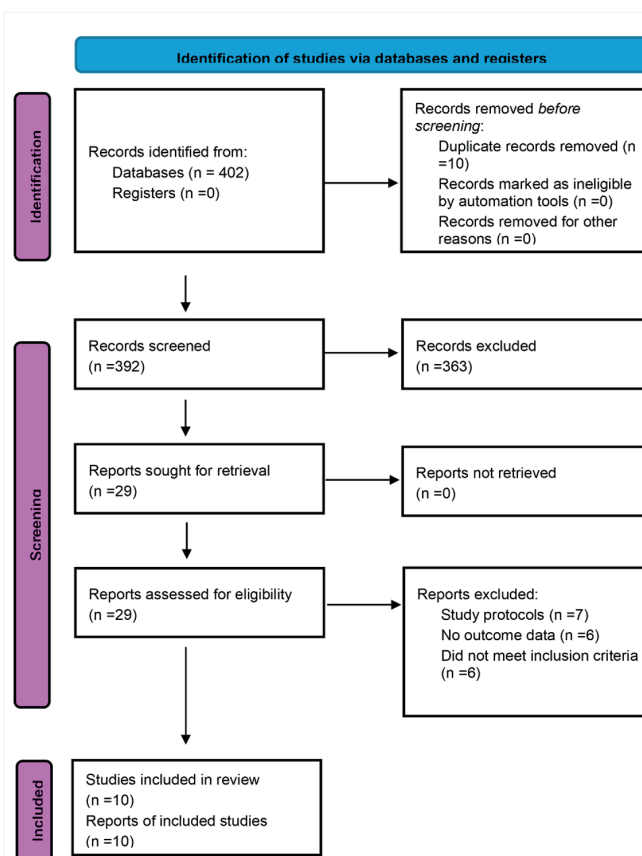


Figure 1. Prisma 2020 flow diagram illustrating the study selection process

The diagram summarizes the flow of information through the phases of the review, including the number of records identified, screened, assessed for eligibility and included in the final synthesis.

and Spain with two studies each, and Switzerland and Israel contributing one study each (Figure 2).

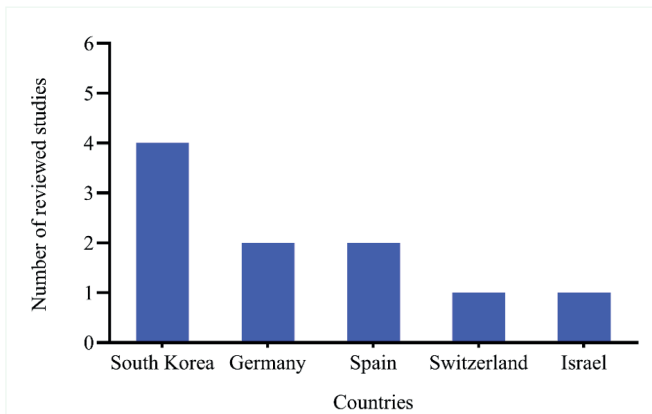
South Korea's active involvement in researching the treatment of DA in adolescents is confirmed in many reviews (Cemiloglu et al., 2022; Karakose et al., 2022; Schneider et al., 2017). This can be attributed to the nation's technological advancements and high rates of internet and smartphone usage that have created a fertile ground for studying the impact of digital devices on youth. This geographic distribution highlights the global concern regarding DA among adolescents but also points to a concentration of research activity in regions with high digital connectivity.

Screening Instruments and Diagnostic Criteria

The Korean Smartphone Addiction Proneness Scale was the most frequently utilized screening instrument, employed in four studies. Other notable instruments included the Compulsive Internet Use Scale and the German Video Game Dependency Scale. The use of multiple diagnostic tools

Table 1. Citation impact of studies on digital addiction among adolescents

Author	Year	Title
Kor & Shoshani.	2023	Moderating the impact of covid 19 pandemic on children's and adolescents' substance use, digital media use and mental health: a randomized positive psychology addiction prevention program.
Lindenberg et al.	2022	Effectiveness of cognitive behavioral therapy-based in preventing disorder and unspecified internet use disorder in adolescents.
Bong et al.	2021	Effect of cognitive behavioral therapy-based music therapy in Korean adolescents with smartphone and internet addiction.
Szász-Janocha et al.	2021	Treatment outcomes of CBT based group intervention for adolescents with internet use disorder.
Nielsen et al.	2021	Multidimensional family therapy reduces problematic gaming in adolescents: A randomized controlled trial.
Choi et al.	2020	The Effect of Mind Subtraction Meditation Intervention on Smartphone Addiction and the Psychological Wellbeing among Adolescents.
Torres-Rodríguez et al.	2018	Treatment efficacy of a specialized psychotherapy program for internet gaming disorder.
Kim et al.	2018	A Preliminary Study on the Effectiveness of the Peer Relationship Enhancement Program in Adolescents at Risk for Internet and Smartphone Addiction.
González-Bueso et al.	2018	Internet Gaming Disorder in Adolescents: Personality, Psychopathology and Evaluation of a Psychological Intervention Combined With Parent Psychoeducation.
Lee et al.	2016	The effect of home-based daily journal writing in Korean adolescents with smartphone addiction.

**Figure 2.** Geographical distribution of reviewed studies

reflects the complexity of diagnosing DA, which lacks uniform diagnostic criteria globally. Table 2 provides a detailed list of the screening instruments used across the reviewed studies.

Digital Addiction Types

Digital addiction types that have been examined in the studies are IGD, smartphone addiction, internet addiction, and digital media addiction. Figure 3 offers a cumulative view of the research conducted on DA, categorizing the total number of studies by addiction type.

IGD is the most studied type of DA followed by smartphone addiction, indicating a significant scholarly focus on gaming behaviors, possibly due to its formal recognition in diagnostic criteria and the widespread prevalence of gaming. This

emphasis on IGD and smartphone addiction suggests that these forms of digital behavior are considered to have substantial impacts on adolescents, warranting extensive research to develop targeted intervention strategies.

Considering research on DA trends, Figure 4 maps the evolution of DA types considered in the studies selected.

This temporal perspective is important to understand the evolution of research interests and responsiveness of the academic community to emerging trends. The graphic shows a peak in studies on smartphone addiction in 2018 as a response to the proliferation of these devices. Meanwhile, the recent rise in digital media addiction studies indicates an adaptive focus on new and evolving forms of DA.

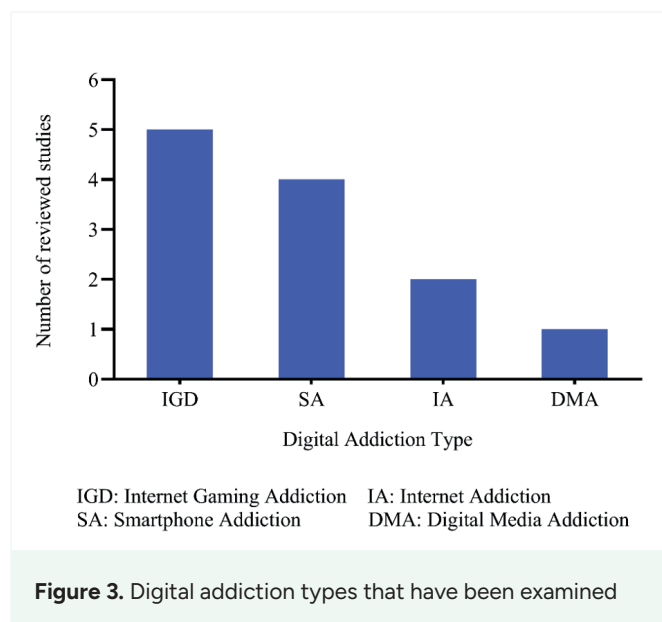
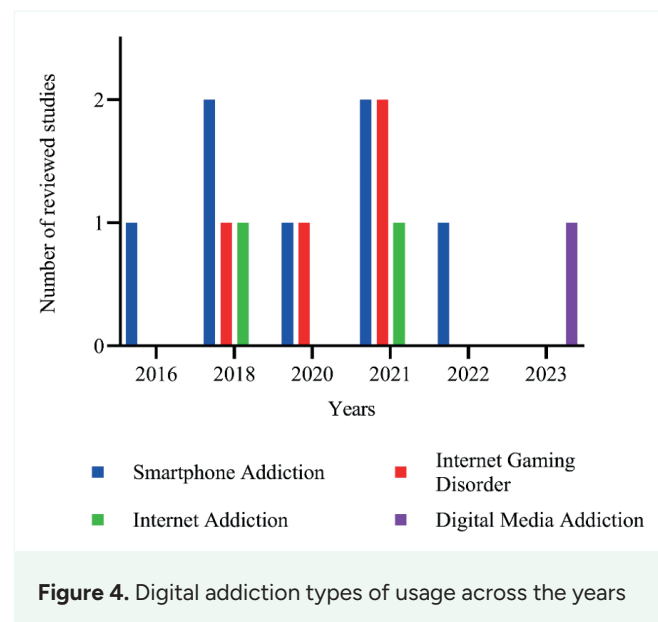
Intervention Effectiveness

In the domain of intervention strategies, different approaches and methodologies were applied across different studies. The systematic comparison highlights the diversity of experimental interventions targeting DA by examining key parameters such as study design, participant characteristics, age range, extent of parental involvement, the nature of the intervention, number of sessions, as well as the presence and duration of follow-up periods (Table 3).

A significant number of the studies reviewed utilized CBT-based interventions (Bong et al., 2021; González-Bueso et al., 2018; Kim et al., 2018; Lee et al., 2016; Lindenberg et al., 2022; Szász-Janocha et al., 2021), with seven out of ten studies incorporating this approach. Additionally, various other interventions are used: peer relationship enhancement (Kim et al., 2018), meditation program (Choi et al., 2020), Multi-Dimensional Family Therapy (MDFT) (Nielsen et al., 2021),

Table 2. Digital addiction screening instruments utilized by countermeasure studies

Digital addiction screening instrument	Studies	Frequency of use
Compulsive Internet Use Scale CIUS (Meerkerk et al., 2010)	(Szász-Janocha et al., 2021)	1
German Video Game Dependency Scale CSAS (Rehbein et al., 2015)	(Lindenberg et al., 2022; Szász-Janocha et al., 2021)	2
Screen time scale (Mark & Janssen, 2008)	(Kor & Shoshani, 2023)	1
Petry's IGD scale (Petry & O'Brien, 2013)	(Nielsen et al., 2021)	1
DSM 5 IGD criteria (American Psychiatric Association, 2013)	(Lindenberg et al., 2022; Nielsen et al., 2021; Szász-Janocha et al., 2021; Torres-Rodríguez et al., 2018)	4
Abbreviated Self Completion Teen-Addiction Severity Index (ASC T-ASI) (Reckers-Droog et al., 2020)	(Nielsen et al., 2021)	1
Internet gaming disorder test IGD-20 Pontes, 2014)	(Torres-Rodríguez et al., 2018)	1
Motivation scale for smartphone regulation (Individual Counseling Manual for Smartphone Addiction. Seoul: Ministry of Gender Equality & Family, 2013)	(Lee et al., 2016)	1
Korean Smartphone Addiction Proneness Scale (Kim et al., 2014)	(Bong et al., 2021; Choi et al., 2020; Kim et al., 2018; Lee et al., 2016)	4
DQVMIA diagnostic questionnaires for video games, mobile phone or internet addiction (Stinchfield, 2003)	(González-Bueso et al., 2018)	1
Young internet addiction scale YIAT Young, 1998)	(Bong et al., 2021)	1
Korean Internet Addiction Proneness Scale (Kim et al., 2008)	(Kim et al., 20018)	1

**Figure 3.** Digital addiction types that have been examined**Figure 4.** Digital addiction types of usage across the years

and Positive Psychology Addiction Prevention (PPAP) (Kor & Shoshani, 2023).

The interventions varied significantly in terms of duration, ranging from four sessions over a month (Lindenberg et al., 2022; Szász-Janocha et al., 2021) to programs extending up to six months (Nielsen et al., 2021). Parental involvement was reported in 40% of the studies (González-Bueso et al., 2018; Lee et al., 2016; Nielsen et al., 2021; Torres-Rodríguez et al., 2018), indicating a recognition of the role families play in the treatment process.

Long-term follow-up was inconsistent across studies, with 60% conducting follow-ups to assess the sustainability of the results (Choi et al., 2020; Kor & Shoshani, 2023; Lindenberg et al., 2022; Nielsen et al., 2021; Szász-Janocha et al., 2021; Torres-Rodríguez et al., 2018). Notably, studies without follow-up evaluations highlighted a significant gap in understanding the long-term efficacy of interventions.

Table 3. Summary of study characteristics and intervention details

Reference	Design	N	Age	Parent participation	Intervention type	Sessions	Follow up
(Kor & Shoshani, 2023)	RCT	1670	10 to 16	no	Positive psychology addiction prevention PPAP	30 units lasting two hours each	3 years longitudinal repeated measures
(Lindenberg et al., 2022)	RCT	422	12 to 18	no	CBT based group program protect+	4 weekly sessions	After 1, 4 and 12 months
(Bong et al., 2021)	Two-arm, non-RCT	155	10 to 16	no	CBT and CBT with MT	8 sessions of 75 min	no
(Szász-Janocha et al., 2021)	Single-arm longitudinal study	54	9 to 19	no	CBT based group program protect+	4 weekly sessions	After 4 and 12 months
(Nielsen et al., 2021)	RCT	42	12 to 19	Family therapy	MDFT Vs Family therapy as usual	6 months	12 months
(Choi et al., 2020)	Two-arm, non-RCT	49	16	no	Meditation intervention	20 min per session in the morning 2 times a week for 12 weeks	4 weeks after completion
(Torres-Rodríguez et al., 2018)	Two-arm Non-RCT	31	12 to 18	Family intervention	PIPATIC program is a specialized program for adolescent's IGD (CBT approach)	22 sessions of 45 min weekly for 6 months	After 3 months
(Kim et al., 2018)	pre-post quasi-experimental design	33	14 to 15	no	Peer Relationship enhancement program, CBT program	8 sessions of 50 min once a week	no
(González-Bueso et al., 2018)	Quasi experimental two-arm study	30	12 to 21	Psychoeducational group for parents	CBT or CBT plus psychoeducation for parents	12 sessions of 45 min: 4 sessions weekly, 4 sessions biweekly and 4 sessions monthly	no
(Lee et al., 2016)	Quasi experimental pre-post study	335	12 to 19	Discuss the issue with parents	Home based daily journal of smartphone use based on CBT	2 weeks	no

Note: N, Participants; IGD, Internet Gaming Disorder; CBT, Cognitive Behavioral Therapy; MT, Musical Therapy; MDFT, Multi-Dimensional Family Therapy; RCT, Randomized Controlled Trial.

Effect Sizes of Intervention Studies on Digital Addiction

Across the 10 studies, means, standard deviations, and sample sizes were extracted for each intervention group at all available time points (baseline and follow-up). For each comparison (e.g., baseline → 6 months, baseline → 12 months), Cohen's *d* was first computed using the pooled within-group standard deviation. To correct for small sample bias and ensure comparability across studies, each *d* value was multiplied by Hedges' correction factor ($J = 1 - 3 / (4N - 9)$), where *N* is the total sample size, yielding Hedges' *g*. These *g* values, calculated separately for each group and outcome, form the basis for the cross-study effect size synthesis presented in Table 4.

Kor & Shoshani (2023) evaluated the effect of a school-based positive psychology intervention on adolescents' screen-related behaviors using the Screen Time Scale. This scale

assessed daily recreational use across television/internet, social media, and gaming, summed into a total score. For the intervention group, screen time remained stable from baseline (T1) to post-intervention (T2), with a calculated effect size of Hedges' *g* = 0.002, indicating no meaningful change. At 12-month follow-up (T3), the change was still minimal (*g* = 0.048), consistent with the author-reported within-group effect of Cohen's *d* = 0.05 in Table 3. In contrast, the control group showed a moderate increase in screen time both post-intervention (*g* = 0.273) and at follow-up (*g* = 0.337). Although the authors mention a medium effect size (*d* = 0.60) in the text, this likely refers to a between-group intervention effect rather than a within-group change. These findings suggest that the intervention was effective in stabilizing screen time over time, while the control group experienced notable increases.

To quantify the effectiveness of the PROTECT intervention reported by Lindenberg et al. (2022), symptom severity scores of Internet Use Disorder were examined using the CSAS scale

Table 4. Summary of study characteristics and intervention details

Study	Scale		T1	T2	T3
(Kor & Shoshani, 2023)	STS		Baseline	Post intervention Cohen's d = 0.002 Hedges' g = 0.002	After 12 months Cohen's d = 0.05 Hedges' g = 0.048
(Lindenberg et al., 2022)	CSAS (inter-group effect size)		After 1 month Cohen's d = 0.10 Hedges g = 0.095	After 4 months Cohen's d = 0.22 Hedges g = 0.22	After 12 months Cohen's d = 0.67 Hedges g = 0.665
(Bong et al., 2021)	CBT group	YIAT	Post intervention Cohen's d = 0.59 Hedges g = 0.59	n.d.	n.d.
		SAPS	Cohen's d = 0.73 Hedges g = 0.73	n.d.	n.d.
	CBT+MT group	YIAT	Cohen's d = 1.06 Hedges g = 1.05	n.d.	n.d.
		SAPS	Cohen's d = 0.73 Hedges g = 0.72	n.d.	n.d.
(Szász-Janocha et al., 2021)	CIUS		Post intervention Cohen's d = 0.059 Hedges g = 0.059	After 4 months Cohen's d = 0.219 Hedges g = 0.216	After 12 months Cohen's d = 1.003 Hedges g = 0.989
	CSAS-SR		Cohen's d = 0.049 Hedges g = 0.048	Cohen's d = 0.230 Hedges g = 0.227	Cohen's d = 0.741 Hedges g = 0.731
	CSAS-PR		Cohen's d = 0.854 Hedges g = 0.843	Cohen's d = 0.645 Hedges g = 0.636	Cohen's d = 0.960 Hedges g = 0.946
(Nielsen et al., 2021)	Petry's IGD scale	MDFT intervention	n.d.	After 6 months n.d.	After 12 months n.d.
		FTAU intervention	n.d.	n.d.	n.d.
(Choi et al., 2020)	KSAPS		Post intervention Cohen's d = 0.59 Hedges g = 0.57	After 1 month Cohen's d = 1.04 Hedges g = 1.01	n.d.
Torres-Rodríguez et al., 2018)	IGD-20	PIPATIC intervention	Post intervention n.d.	After 3 months n.d.	n.d.
		CBT intervention	n.d.	n.d.	n.d.
(Kim et al., 2018)	KIAPS		Post intervention Cohen's d = 1.16 Hedges g = 1.13	n.d.	n.d.
	KSAPS		Post intervention Cohen's d = 0.94 Hedges g = 0.92	n.d.	n.d.
(González-Bueso et al., 2018)	DQVMIA		Post intervention Cohen's d = 1.17 Hedges g = 1.14	n.d.	n.d.
(Lee et al., 2016)	KSAPS		Post intervention Cohen's d = 0.74 Hedges g = 0.73	n.d.	n.d.

Note: n.d., No Data; STS, Screen Time Scale; CSAS, German Video Game Dependency Scale; YIAT, Young Internet Addiction Scale; CIUS, Compulsive Internet Use Scale; German Video Game Dependency Scale-Self Report; CSAS-PR, German Video Game Dependency Scale-Parental Report; MDFT, Multidimensional Family Therapy; FTAU, Family Therapy As Usual; IGD, Internet Gaming Disorder; IGD-20, Internet Gaming Disorder Test; CBT, Cognitive Behavioral Therapy; KIAPS, Korean Internet Addiction Proneness Scale; KSAPS, Korean Smartphone Addiction Proneness Scale; DQVMIA, diagnostic questionnaires for video games, mobile phone or internet addiction.

at four time points: baseline (T0), 1-month (T1), 4-month (T2), and 12-month follow-up (T3). The authors reported a Cohen's d of 0.67 for the PROTECT group from baseline to 12 months, reflecting a moderate to large effect size. To complement this, Cohen's d and Hedges' g were calculated at earlier follow-up points using the means and standard deviations provided in Supplementary Table 2. For the PROTECT group, the effect size at 1 month was small ($g = 0.095$), while a modest reduction in symptom severity was observed at 4 months ($g = 0.22$). These estimates were derived using the pooled standard deviation between baseline and each respective follow-up. Importantly, all effect size calculations were based on the same instrument (CSAS) administered consistently across all time points, ensuring the methodological validity of within-group comparisons.

In the study by Bong et al. (2021), the authors did not report any effect size indices for within-group changes. Therefore, Cohen's d and Hedges' g were calculated using pre- and post-intervention means, with baseline standard deviations as denominators to ensure consistency across studies. For the Young Internet Addiction Test (YIAT), the CBT + MT group showed a large within-group effect (Hedges' $g = 1.05$), whereas the CBT-only group demonstrated a moderate effect ($g = 0.59$), suggesting a stronger impact when music therapy was added to cognitive-behavioral treatment. In contrast, for the Smartphone Addiction Proneness Scale (SAPS), both groups showed similar moderate-to-large effect sizes ($g = 0.72$ for CBT + MT and $g = 0.73$ for CBT), indicating that both interventions were comparably effective in reducing smartphone-related addictive behaviors. Notably, no follow-up assessments were conducted beyond the 8-week intervention period, limiting conclusions regarding the durability of treatment effects.

The original article by Szász-Janocha et al. (2021) reported within-group effect sizes (Cohen's d) only for the change between baseline and 12-month follow-up. The recalculated values closely match the authors' reported d values across all three primary outcome measures (CIUS, CSAS-SR, CSAS-PR), suggesting that a similar computation method was used. Minor differences (e.g., $d = 0.960$ vs. 0.961) are likely due to rounding. However, unlike the original study, Hedges' g was also calculated to correct for small sample bias, and effect sizes at additional time points (post-intervention and 4-month follow-up). This offers a more detailed picture of the intervention's progression over time and ensures consistency across all studies included in this review.

The study by Nielsen et al. (2021) assessed the severity of IGD using the DSM-5 criteria with Petry's 9-item dichotomous scale. While the article reports pre-post reductions in IGD symptom count for both the MDFT and Family therapy as usual (FTAU) groups, group-specific means and standard deviations were only partially available. Although intergroup effect sizes were reported by the authors (Cohen's $d = 1.23$ at 6 months and $d = 0.93$ at 12 months), the lack of sufficient data (e.g., SDs at follow-up per group, or exact within-group means) prevented us from recalculating intra-group effect sizes using the standardized formula based on baseline SDs. As a result,

this study was excluded from the pooled within-group meta-analytic comparison to ensure methodological consistency across studies. However, its intergroup effect sizes remain informative and indicate a moderate-to-large advantage for MDFT over FTAU in reducing IGD symptoms over time.

In the study by Choi et al. (2020), the authors did not report effect sizes; therefore, effect sizes were calculated based on the total score of the Korean Smartphone Addiction Proneness Scale (KSAPS) using the standardized mean difference, with the baseline standard deviation as the denominator. For the experimental group, the KSAPS total score decreased from 33.88 (SD = 7.19) at baseline to 29.63 post-intervention and 26.38 at one-month follow-up. This corresponds to a medium within-group effect immediately post-intervention ($g = 0.57$), and a large effect at follow-up ($g = 1.01$), suggesting that the impact of the mind subtraction meditation program not only persisted but continued to strengthen in the weeks following the intervention.

For the study by Torres-Rodríguez et al. (2018), standardized effect sizes could not be calculated due to the lack of means and standard deviations at follow-up points; only median scores and a baseline standard deviation were reported. Attempts to compute Hedges' g from these data yielded implausibly inflated values, likely due to the combination of very low baseline variance and large observed reductions. Nevertheless, the study reported a substantial drop in IGD symptoms: in the PIPATIC group, the IGD-20 score decreased from a baseline median of 79.75 to 32.19 post-treatment and 30.69 at 3-month follow-up. In the CBT control group, scores decreased from 76.13 to 51.93 post-treatment, then slightly increased to 56.40 at follow-up. These results suggest clinically meaningful improvement, especially in the integrative PIPATIC condition, despite the absence of standardized effect size estimates. While these changes appear clinically meaningful, the lack of valid effect size estimates led us to exclude this study from the quantitative comparison table.

Kim et al. (2018) conducted a pre-post quasi-experimental study to evaluate the Peer Relationship Enhancement Program among adolescents at risk for Internet and smartphone addiction. Using the Korean Internet Addiction Proneness Scale (KIAPS) and Korean Smartphone Addiction Proneness Scale (KSAPS), they reported significant reductions in both scores after the 8-week intervention. Although the authors did not report effect sizes, within-group standardized mean differences were calculated using baseline standard deviations. For KIAPS, the effect size was $d = 1.16$ and Hedges' $g = 1.13$, indicating a large effect. For KSAPS, $d = 0.94$ and $g = 0.92$, also reflecting a large effect. These findings support the short-term efficacy of the intervention in reducing self-reported DA symptoms.

González-Bueso et al. (2018) did not report standardized effect sizes such as Cohen's d or Hedges' g . Following the method, within-group effect sizes for the DQVMIA total score were calculated using the baseline standard deviation as the denominator. The mean score decreased from 6.20 at baseline to 4.37 post-intervention (SD = 1.56), yielding an effect size of

Cohen's $d = 1.17$ and Hedges' $g = 1.14$. These values reflect a very large improvement in IGD symptomatology following the CBT intervention. Using the baseline SD ensures comparability across studies by avoiding bias from post-treatment variance reduction.

Lee et al. (2016) evaluated the effect of a two-week home-based daily journal (HDJ-S) on smartphone addiction among Korean adolescents identified as high risk, using the Korean Smartphone Addiction Proneness Scale (KSAPS). While the authors reported a significant pre-post reduction in KSAPS scores ($t = 5.87$, $p < .001$), they did not report standardized effect sizes. Following the method, within-group effect sizes were calculated using the baseline standard deviation: Cohen's $d = 0.76$ and Hedges' $g = 0.74$, both indicating a moderate treatment effect. These results suggest that the HDJ-S may be an effective short-term strategy to reduce problematic smartphone use in high-risk adolescents, although the absence of a control group limits causal interpretations.

Areas for Future Research

The increasing availability of self-help software applications aimed at helping individuals manage their digital device usage marks a significant trend (Haug et al., 2020; Lin et al., 2017). The analysis of selected studies shows the absence of software-mediated therapies suggesting a potential area for future exploration. Such interventions could offer scalable solutions to reach a broader audience and provide more flexible treatment options for DA.

Discussion

The findings from this narrative review highlight significant insights into the prevention and therapy interventions for DA among adolescents. This discussion contextualizes these findings within the broader landscape of current research, challenges faced, and potential future directions.

Screening Instruments and Diagnostic Complexity in Digital Addiction

Exploring interventions for a condition that lacks clear definition is a significant challenge. For instance, while Gaming Disorder is recognized as a diagnosable clinical disorder under both the American Psychiatric Association and the World Health Organization criteria, other forms of DA, such as internet or social media use, do not currently meet the criteria for diagnosis under these systems. This discrepancy raises important questions about the appropriate terminology to use when discussing interventions and changes in these behaviors.

Despite these challenges, there is a growing trend to treat all forms of DA as behaviors associated with harm that individuals might want to change. The evolution of digital media over the past decade has influenced the development of screening instruments, which have traditionally focused

more on the psychological impacts and related harmful consequences than on the digital medium itself (Cemiloglu et al., 2022). The evolution of internet addiction screening instruments has been influenced by the emergence of new technologies and media. Chóliz proposed three screening tools for different technological addictions, including internet and social networks (Chóliz et al., 2017). Lortie highlighted the need for refinement in the design of internet addiction assessment tools, particularly in the representation of the social dimension (Lortie & Guitton, 2013). Laconi et al. (2014) emphasized the importance of further validation work for existing scales (Laconi et al., 2014). These studies collectively underscore the ongoing evolution and refinement of internet addiction screening instruments in response to the changing landscape of internet media and connected devices.

Furthermore, most of the studies combined multiple diagnostic tools due to the lack of uniform diagnostic criteria. Some of the reviewed studies assess the effectiveness of interventions based on the reduction of time spent on digital devices post-intervention. While this measure is critical in evaluating the outcomes of countermeasures, it may oversimplify the complex nature of DA. Time spent on devices alone does not necessarily reflect problematic usage, as the use might be intentional and important to the individual. Moreover, focusing solely on reduced screen time addresses only one symptom of DA and overlooks other dimensions of the condition. It is possible for individuals to suffer from DA without exhibiting excessive usage patterns, highlighting the need for a more nuanced approach to diagnosing and treating this modern malaise.

Comparison with Existing Literature

The reliance on CBT aligns with existing literature that recognizes CBT as one of the most effective approaches for treating various forms of addiction, including DA. The predominance of CBT-based interventions in research may be attributed to its well-established theoretical framework and extensive empirical validation in treating behavioral addictions (Han et al., 2020). In contrast, alternative interventions such as family therapy, mindfulness-based programs, or positive psychology interventions are relatively newer and may lack standardized protocols, making them harder to assess through controlled trials. Furthermore, many intervention studies focus on short-term efficacy, whereas approaches like mindfulness and family therapy often require long-term engagement, which may pose methodological challenges for researchers (Shin et al., 2021). Future studies should explore the potential of these alternative interventions, particularly in culturally diverse contexts where family dynamics play a significant role in adolescent digital behavior.

Within the context of DA, CBT was used to increase self-awareness on addictive usage by highlighting internal and external triggers that challenge their impulse control and by highlighting feelings, psychological needs, and cognitive distortions behind excessive use (Han et al., 2020). For instance, the "all or nothing thinking" where individuals may

see their digital interactions as either completely rewarding or a total waste, with no middle ground; they might believe that if they're not always connected, they are completely out of the loop or socially isolated. CBT aims to challenge these distortions by examining evidence against extreme beliefs and developing more balanced, realistic thoughts. Clients engage in behavioral experiments to test these new perspectives, helping them realize that not being constantly online does not result in extreme social isolation. This process is supported by skill-building activities that enhance offline interactions and manage online time, fostering healthier digital habits and reducing dependency on constant connectivity (Lindenberg et al., 2020).

It is noteworthy that most of the studies included in this review originate from South Korea, Germany, and Spain. This reflects the current distribution of research on intervention strategies for adolescent DA, rather than a limitation of the review itself, as the selection process was strictly based on predefined inclusion and exclusion criteria. While research on DA exists globally, studies specifically evaluating remediation methods for adolescents appear to be concentrated in a few countries, particularly those with structured national programs addressing problematic digital use (Chun et al., 2017). This suggests that the gap is not necessarily in the study of DA itself, but in the development and empirical evaluation of adolescent-targeted intervention programs across diverse cultural contexts. Future research should aim to expand the examination of such interventions to a wider range of countries to improve the generalizability of findings.

The role of parental involvement in the treatment of adolescent DA cannot be overstated. The review found that interventions incorporating a family approach tended to report better outcomes, echoing the findings of Shin (2021), who emphasized the critical role families play in the management and recovery from DA (Shin et al., 2021). This underscores the necessity for intervention programs to not only target the adolescents but also engage their families to maximize the effectiveness of the treatments.

Intervention Effectiveness Based on Effect Sizes

The reviewed intervention studies targeting DA in adolescents demonstrate considerable variability in effect sizes, reflecting differences in intervention types, study designs, measurement tools, and follow-up durations. Among the most effective programs were those combining multiple therapeutic components. For instance, Bong et al. (2021) reported large effects for the CBT + MT group ($g = 1.05$ on YIAT), compared to a moderate effect for CBT alone ($g = 0.59$), indicating the added value of music therapy. Similarly, Kim et al. (2018) and González-Bueso et al. (2018) both yielded large within-group effects ($g \approx 1.1$), suggesting strong efficacy of their respective CBT-based interventions.

In contrast, Kor & Shoshani (2023) showed minimal change over time ($g = 0.002$ – 0.048), likely due to the universal prevention nature of the intervention and low initial symptom

severity. Intermediate results were observed in studies like Lee et al. (2016) ($g = 0.74$) and Choi et al. (2020) ($g = 0.57$ – 1.01), reflecting effective, short-term reductions in smartphone addiction.

Longitudinally, Lindenberg et al. (2022) also showed a trend of progressive improvement, with Hedges' g rising from 0.095 at 1-month follow-up to 0.22 at 4 months and reaching 0.665 at 12 months, indicating a moderate to large effect over time. Similarly, Szász-Janocha et al. (2021) provided follow-up data at three time points (post-intervention, 4 months, 12 months), revealing a steady increase in effect sizes as well (CIUS: $g = 0.06 \rightarrow 0.22 \rightarrow 0.99$), suggesting long-term consolidation of treatment gains.

However, two studies (Nielsen et al., 2021; Torres-Rodríguez et al., 2018) were excluded from quantitative comparison due to insufficient or incompatible data (missing SDs or median-only reporting), although descriptive results suggest clinical improvement.

Overall, the largest within-group effects were consistently observed in targeted or clinical interventions employing CBT (alone or in combination), while universal school-based programs tended to show smaller effects. The correction using Hedges' g ensured consistency across studies, particularly for those with small sample sizes. These findings highlight the need for long-term follow-up and standardized reporting practices to enhance comparability and evidence synthesis in DA interventions.

Gaps and Limitations

An important limitation when comparing effect sizes across studies is the variability in follow-up duration. Some of the strongest treatment effects were only observed at the 12-month follow-up, suggesting that therapeutic benefits often emerge progressively over time. In contrast, several interventions (e.g., Kor & Shoshani, Choi et al., Lee et al.) conducted outcome assessments at much shorter time frames (4 to 6 weeks or 3 months), potentially underestimating the full impact of the intervention. This discrepancy makes direct comparison challenging, as studies with limited follow-up may report lower g values not due to lower efficacy, but simply due to insufficient time for behavior change to consolidate. Future research should prioritize longitudinal assessment designs to ensure fair and informative comparison across intervention types.

Furthermore, the absence of software-mediated therapies in the reviewed studies suggests a missed opportunity in adolescents' treatment and prevention of DA, as these could potentially provide accessible, cost-effective, and wide-reaching interventions. Although various studies have explored the use of mobile applications and digital interventions for addressing DA, none met the inclusion criteria of this review, likely due to the focus on adolescent-specific interventions. This suggests that while such solutions may be available, their application in adolescent populations remains underexplored.

or underreported in empirical research. The integration of software-based approaches with traditional interventions could offer promising avenues for enhancing accessibility and adherence among adolescents, warranting further investigation in future studies.

Moreover, the use of self-reported data inherently carries several weaknesses that compromise the reliability and validity of the findings. For example, self-reported responses can be influenced by social desirability bias, where participants may underreport behaviors perceived as undesirable, or by memory recall bias, which affects the accuracy of reported data. According to Araujo et al., 2017 there is a considerable discrepancy between self-reported internet use and actual usage tracked via digital tools, noting that individuals with higher levels of internet use tended to significantly underreport their usage. These factors underscore the need for incorporating more objective measures alongside self-reports to ensure a more comprehensive understanding of DA and the efficacy of its interventions. One way to mitigate these limitations is to integrate passive data collection methods, such as smartphone usage tracking applications and real-time behavioral monitoring, which can provide more accurate and objective measurements of digital consumption patterns (Ellis et al., 2019). Additionally, combining self-reports with parental or teacher assessments could enhance reliability, particularly in adolescent populations where self-perception biases may influence responses. Future studies should prioritize mixed-method approaches that blend subjective self-reports with objective tracking tools to improve the accuracy of DA assessments.

Implications for Future Research

The current review has identified several areas ripe for further investigation. Future research should explore the development and effectiveness of software-mediated interventions, which could include apps or web-based programs designed to manage DA. Additionally, more rigorous longitudinal studies are needed to assess the long-term effectiveness of these interventions and the role of emerging technologies in both exacerbating and treating DA.

Theoretical and Practical Contributions

This review contributes to the theoretical understanding of DA by synthesizing findings from a decade of research, offering a clearer picture of effective strategies and highlighting the essential components of successful interventions. Practically, the findings can assist clinicians and policymakers in designing and implementing more effective strategies for combating DA, with an emphasis on family involvement and the potential for digital solutions. In educational settings, schools could integrate structured digital literacy programs and responsible technology use training into their curricula, focusing on self-regulation strategies for adolescents. Additionally, school counselors and educators should be equipped with screening tools to identify at-risk students early and provide targeted interventions. From a public health perspective, policymakers

could develop national guidelines for healthy digital consumption, incorporating evidence-based prevention and intervention programs like those implemented for substance use prevention. Governments and NGOs could also collaborate to fund research on scalable, software-mediated interventions that can be widely distributed to adolescents and their families. Future work should explore how multi-sector collaboration can bridge the gap between research findings and policy implementation.

Conclusion

This narrative review has provided a comprehensive examination of the existing preventive and therapeutic interventions for DA among adolescents from 2013 to 2023. Through a meticulous review of peer-reviewed literature, this study has highlighted the effectiveness of various intervention strategies, particularly those based on CBT, and identified significant gaps in current research practices.

Major Findings

The findings of this review indicate that CBT-centric methods are both common and successful in addressing DA in adolescents. Parental participation has emerged as an essential element, significantly boosting intervention outcomes. A critical shortfall identified is the lack of sustained follow-ups in research, which are crucial to evaluating the long-term impact of treatments. Furthermore, an evident gap is the current absence of interventions supported by software, suggesting an avenue for future research and development.

Theoretical and Practical Implications

Theoretically, this review contributes to the understanding of DA by framing it within the context of adolescent-specific needs and the effectiveness of tailored interventions. Practically, the findings can assist clinicians and policymakers in designing and implementing more effective strategies for combating DA, with an emphasis on family involvement and the potential for digital solutions.

Recommendations for Future Research

Given the gaps identified, future research should focus on:

- Conducting long-term studies to evaluate the durability of the interventions' effects.
- Investigating the role of emerging digital technologies in both exacerbating and alleviating DA.
- Future studies should also adopt an interdisciplinary approach, integrating insights from psychology, neuroscience, education, and technology studies to develop more holistic intervention frameworks. Collaboration between behavioral scientists, software developers, and policymakers could lead to the creation of adaptive intervention programs tailored to adolescent needs. Additionally, exploring the neurobiological

mechanisms underlying DA could provide valuable insights into personalized treatment strategies. Such interdisciplinary efforts will be crucial in advancing the field and ensuring that interventions are both evidence-based and scalable across diverse populations.

As digital technologies continue to evolve and integrate deeper into daily life, understanding and addressing DA in adolescents is more crucial than ever. This review not only sheds light on effective intervention strategies but also paves the way for innovative approaches to enhance the resilience of young individuals against the challenges posed by DA.

Author contributions

Conception and design: S.I., B.T.; Data acquisition: S.I.; Data analysis: S.I., B.T.; Data interpretation: S.I., B.T.; Drafting of the manuscript: S.I.; Critical revision of the manuscript: S.I., B.T. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Data availability statement

Data sharing is not applicable to this article as no new datasets were generated or analyzed during this study.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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References

- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders: DSM-5* (5th ed). American Psychiatric Association.
- Araujo, T., Wonneberger, A., Neijens, P., & de Vreese, C. (2017). How much time do you spend online? Understanding and improving the accuracy of self-reported measures of Internet Use. *Communication Methods and Measures*, 11(3), 173-190. [Crossref]
- Bağatarhan, T., & Siyez, D. M. (2017). The effectiveness of a Cognitive-Behavioral prevention program for internet addiction. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 40(4), 767-792. [Crossref]
- Beck, A. T. (1979). *Cognitive therapy and the emotional disorders*. Penguin.
- Bong, S. H., Won, G. H., & Choi, T. Y. (2021). Effects of Cognitive-Behavioral Therapy based Music Therapy in Korean adolescents with smartphone and internet addiction. *Psychiatry Investigation*, 18(2), 110-117. [Crossref]
- Brand, M., Rumpf, H.-J., Demetrovics, Z., Muller, A., Stark, R., King, D. L., Goudriaan, A. E., Mann, K., Trotzke, P., Fineberg, N. A., Chamberlain, S. R., Kraus, S. W., Wegmann, E., Billieux, J., & Potenza, M. N. (2020). Which conditions should be considered as disorders in the International Classification of Diseases (ICD-11) designation of "other specified disorders due to addictive behaviors"? *Journal of Behavioral Addictions*, 11(2), 150-159. [Crossref]
- Carver, C. S., & Scheier, M. F. (2001). *On the self-regulation of behavior*. Cambridge University Press.
- Cemiloglu, D., Almourad, M. B., McAlaney, J., & Ali, R. (2022). Combatting digital addiction: Current approaches and future directions. *Technology in Society*, 68, 101832. [Crossref]
- Choi, E.-H., Chun, M. Y., Lee, I., Yoo, Y.-G., & Kim, M.-J. (2020). The effect of mind subtraction meditation intervention on smartphone addiction and the psychological wellbeing among adolescents. *International Journal of Environmental Research and Public Health*, 17(9), 3263. [Crossref]
- Chóliz, M., Echeburúa, E., & Ferre, F. (2017). Screening tools for technological addictions: A proposal for the strategy of mental health. *International Journal of Mental Health and Addiction*, 15(2), 423-433. [Crossref]
- Chun, J., Shim, H., & Kim, S. (2017). A meta-analysis of treatment interventions for internet addiction among Korean adolescents. *Cyberpsychology, Behavior and Social Networking*, 20(4), 225-231. [Crossref]
- Department of Education, Seoul National University. (2013). *Individual counseling manual for smartphone addiction*. Seoul: Ministry of Gender Equality & Family.
- Ellis, D. A., Davidson, B. I., Shaw, H., & Geyer, K. (2019). Do smartphone usage scales predict behavior? *International Journal of Human-Computer Studies*, 130, 86-92. [Crossref]
- González-Bueso, V., Santamaría, J. J., Fernández, D., Merino, L., Montero, E., Jiménez-Murcia, S., Del Pino-Gutiérrez, A., & Ribas, J. (2018). Internet Gaming Disorder in adolescents: Personality, psychopathology and evaluation of a psychological intervention combined with parent psychoeducation. *Frontiers in Psychology*, 9, 787. [Crossref]
- Griffiths, M. D., Kuss, D. J., Billieux, J., & Pontes, H. M. (2016). The evolution of Internet addiction: A global perspective. *Addictive Behaviors*, 53, 193-195. [Crossref]
- Gross, J. J. (1998). The emerging field of emotion regulation: An integrative review. *Review of General Psychology*, 2(3), 271-299. [Crossref]
- Han, J., Seo, Y., Hwang, H., Kim, S. M., & Han, D. H. (2020). Efficacy of cognitive behavioural therapy for Internet Gaming Disorder. *Clinical Psychology and Psychotherapy*, 27(2), 203-213. [Crossref]
- Harscoet, V., Hofer, C., Rusinek, S., & Imrani, S. (2013). Thérapie comportementale et cognitive d'un trouble d'anxiété sociale chez une adolescente de culture arabo-musulmane migrante en France. *Journal de Thérapie Comportementale et Cognitive*, 23(3), 132-141. [Crossref]
- Haug, S., Castro, R. P., Wenger, A., & Schaub, M. P. (2020). Efficacy of a smartphone-based coaching program for addiction prevention among apprentices: Study protocol of a cluster-randomised controlled trial. *BMC Public Health*, 20(1), 1910. [Crossref]
- Imrani, S., & Touri, B. (2025). Adaptation and validation of Moroccan dialect compulsive Internet Use Scale: Validity and reliability. *International Journal of Body, Mind and Culture*, 12(2), 175-187. [Crossref]

- Karakose, T., Tülübaş, T., & Papadakis, S. (2022). Revealing the intellectual structure and evolution of digital addiction research: An integrated bibliometric and science mapping approach. *International Journal of Environmental Research and Public Health*, 19(22), 14883. [\[Crossref\]](#)
- Kim, D., Lee, E., Dong-Min, K. (2008). Development of Internet Addiction Proneness Scale-Short Form(KS scale). *Korea Journal of Counseling*, 9(4), 1703-1722. [\[Crossref\]](#)
- Kim, D., Lee, Y., Lee, J., Nam, J. K., & Chung, Y. (2014). Development of Korean smartphone addiction proneness scale for youth. *PLoS One*, 9(5), e97920. [\[Crossref\]](#)
- Kim, J., Y.-S., Shin, Y.-T., Lim, S.-H., & Seo, J.-W. (2018). A preliminary study on the effectiveness of the peer relationship enhancement program in adolescents at risk for Internet and smartphone addiction. *Journal of Child & Adolescent Psychiatry*, 29(2), 40-46. [\[Crossref\]](#)
- Kor, A., & Shoshani, A. (2023). Moderating the impact of the COVID-19 pandemic on children's and adolescents' substance use, digital media use, and mental health: A randomized positive psychology addiction prevention program. *Addictive Behaviors*, 141, 107660. [\[Crossref\]](#)
- Kuss, D. J., & Lopez-Fernandez, O. (2016). Internet addiction and problematic Internet use: A systematic review of clinical research. *World Journal of Psychiatry*, 6(1), 143-176. [\[Crossref\]](#)
- Laconi, S., Rodgers, R. F., & Chabrol, H. (2014). The measurement of Internet addiction: A critical review of existing scales and their psychometric properties. *Computers in Human Behavior*, 41, 190-202. [\[Crossref\]](#)
- Lee, H., Seo, M. J., & Choi, T. Y. (2016). The effect of home-based daily journal writing in Korean adolescents with smartphone addiction. *Journal of Korean Medical Science*, 31(5), 764-769. [\[Crossref\]](#)
- Lin, Y.-H., Lin, P.-H., Chiang, C.-L., Lee, Y.-H., Yang, C. C. H., Kuo, T. B. J., & Lin, S.-H. (2017). Incorporation of mobile application (app) measures into the diagnosis of smartphone addiction. *Journal of Clinical Psychiatry*, 78(7), 866-872. [\[Crossref\]](#)
- Lindenberg, K., Kindt, S., & Szász-Janocha, C. (2020). *Internet addiction in adolescents: The PROTECT program for evidence-based prevention and treatment*. Springer Nature. [\[Crossref\]](#)
- Lindenberg, K., Kindt, S., & Szász-Janocha, C. (2022). Effectiveness of cognitive behavioral therapy-based intervention in preventing gaming disorder and unspecified Internet use disorder in adolescents: A cluster randomized clinical trial. *JAMA Network Open*, 5(2), e2148995. [\[Crossref\]](#)
- Lortie, C., & Guittou, M. J. (2013). 2664 - Internet addiction: Actual status of assessment tools. *European Psychiatry*, 28(S1), 1. [\[Crossref\]](#)
- Mark, A. E., & Janssen, I. (2008). Relationship between screen time and metabolic syndrome in adolescents. *Journal of Public Health*, 30(2), 153-160. [\[Crossref\]](#)
- Meerkerk, G.-J., van den Eijnden, R. J. J. M., Franken, I. H. A., & Garretsen, H. F. L. (2010). Is compulsive internet use related to sensitivity to reward and punishment, and impulsivity?. *Computers in Human Behavior*, 26(4), 729-735. [\[Crossref\]](#)
- Meskini, N., Lamtai, M., Chakit, M., El Aameri, M., Sfendla, A., Loukili, N., & Ouahidi, M. L. (2024). The relationship between smartphone overuse, anxiety, and depression among middle school adolescents in the city of Kenitra, Morocco: A cross-sectional study. *Middle East Current Psychiatry*, 31(1), 75. [\[Crossref\]](#)
- Nielsen, P., Christensen, M., Henderson, C., Liddle, H. A., Croquette-Krokar, M., Favez, N., & Rigter, H. (2021). Multidimensional family therapy reduces problematic gaming in adolescents: A randomised controlled trial. *Journal of Behavioral Addictions*, 10(2), 234-243. [\[Crossref\]](#)
- Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., Shamseer, L., Tetzlaff, J. M., Akl, E. A., Brennan, S. E., Chou, R., Glanville, J., Grimshaw, J. M., Hróbjartsson, A., Lalu, M. M., Li, T., Loder, E. W., Mayo-Wilson, E., McDonald, S., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*, 372, n71. [\[Crossref\]](#)
- Pan, Y.-C., Chiu, Y.-C., & Lin, Y.-H. (2020). Systematic review and meta-analysis of epidemiology of internet addiction. *Neuroscience and Biobehavioral Reviews*, 118, 612-622. [\[Crossref\]](#)
- Petry, N. M., & O'Brien, C. P. (2013). Internet gaming disorder and the DSM-5. *Addiction (Abingdon, England)*, 108(7), 1186-1187. [\[Crossref\]](#)
- Pontes, D. H. (2014). *The Internet gaming disorder test (IGD-20 test)*. <https://www.halleypontes.com/tests/igd20-test/>.
- Reckers-Droog, V., Goorden, M., Kaminer, Y., van Domburgh, L., Brouwer, W., & Hakkaart-van Roijen, L. (2020). Presentation and validation of the Abbreviated Self Completion Teen-Addiction Severity Index (ASC T-ASI): A preference-based measure for use in health-economic evaluations. *PLoS One*, 15(9), e0238858. [\[Crossref\]](#)
- Rehbein, F., Kliem, S., Baier, D., Möble, T., & Petry, N. M. (2015). Prevalence of internet gaming disorder in German adolescents: Diagnostic contribution of the nine DSM-5 criteria in a state-wide representative sample. *Addiction (Abingdon, England)*, 110(5), 842-851. [\[Crossref\]](#)
- Schneider, L. A., King, D. L., & Delfabbro, P. H. (2017). Family factors in adolescent problematic Internet gaming: A systematic review. *Journal of Behavioral Addictions*, 6(3), 321-333. [\[Crossref\]](#)
- Shapira, N. A., Lessig, M. C., Goldsmith, T. D., Szabo, S. T., Lazoritz, M., Gold, M. S., & Stein, D. J. (2003). Problematic internet use: Proposed classification and diagnostic criteria. *Depression and Anxiety*, 17(4), 207-216. [\[Crossref\]](#)
- Shin, Y.-B., Kim, J.-J., Kim, H., Kim, S.-J., Eom, H., Jung, Y. H., & Kim, E. (2021). Managing game-related conflict with parents of young adults with Internet Gaming Disorder: Development and feasibility study of a virtual reality app. *JMIR Serious Games*, 9(1), e22494. [\[Crossref\]](#)
- Şimşek, N., Zincir, H., Özen, B., & Ceyhan, Ö. (2019). The association between Internet addiction and impulsivity among academicians. *Addicta: The Turkish Journal on Addictions*, 6(2), 269-281. [\[Crossref\]](#)
- Singh, A., & Singh, P. (2019). Recent Trends, Current Research in Cyberpsychology: A literature review. *Library Philosophy and Practice*.
- Stinchfield, R. (2003). Reliability, validity, and classification accuracy of a measure of DSM-IV diagnostic criteria for pathological gambling. *American Journal of Psychiatry*, 160(1), 180-182. [\[Crossref\]](#)
- Szász-Janocha, C., Vonderlin, E., & Lindenberg, K. (2021). Treatment outcomes of a CBT-based group intervention for adolescents with Internet use disorders. *Journal of Behavioral Addictions*, 9(4), 978-989. [\[Crossref\]](#)
- Torres-Rodríguez, A., Griffiths, M. D., Carbonell, X., & Oberst, U. (2018). Treatment efficacy of a specialized psychotherapy program for Internet Gaming Disorder. *Journal of Behavioral Addictions*, 7(4), 939-952. [\[Crossref\]](#)
- World Health Organization. (2024). *Teens, screens and mental health*. <https://www.who.int/europe/news-room/25-09-2024-teens--screens-and-mental-health>.
- Young, K. S. (1998). *Caught in the net: How to recognize the signs of Internet addiction-And a winning strategy for recovery*. John Wiley & Sons.

E-cigarette use, thirdhand smoke awareness, and motivation to participate in physical activity in adolescents

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Abstract

This study aims to investigate the levels of e-cigarette use, thirdhand smoke awareness, and motivation to participate in physical activity among adolescents, to reveal the relationship between these variables and to contribute to reducing future health risks. This descriptive and cross-sectional study included 657 volunteer students from a vocational and technical Anatolian high school. Data were collected using the "Thirdhand Smoke Awareness Scale" and the "Physical Activity Participation Motivation Scale," and analyzed using SPSS 26 software. Among the participants, 21.5% reported cigarette use, and 19.6% reported e-cigarette use. Non-smoking students demonstrated significantly higher physical activity motivation scores (54.67 ± 9.91) than smokers (52.08 ± 7.74) ($p < .01$). The mean thirdhand smoke awareness score was 32.44 ± 9.38 , with awareness levels correlating with parental education levels ($p < .05$). A weak positive correlation was identified between physical activity motivation and thirdhand smoking awareness ($r = 0.153$, $p < .01$). Students who exercised regularly exhibited significantly higher physical activity motivation scores (57.09 ± 10.64) than those who did not (52.02 ± 8.08) ($p < .01$). This study reveals that cigarette and e-cigarette use is a widespread public health problem among young people and that these behaviors begin at an early age. This study emphasizes the importance of educational programs and regulatory measures to reduce cigarette and e-cigarette use, promote physical activity, and increase awareness of thirdhand smoke.

Keywords: awareness, e-cigarette, physical activity, thirdhand smoke

Main points

- The manuscript addresses the following key points:
- E-cigarette use: The e-cigarette use among adolescents is investigated.
- Awareness of thirdhand smoke: The study investigates the awareness levels of adolescents regarding thirdhand smoke.
- Motivation to participate in physical activity: The relationship between adolescents' motivation to participate in physical activity and their awareness of thirdhand smoke is investigated.

Introduction

The use of cigarettes and other tobacco products is a serious public health issue with fatal consequences and a global impact. According to recent statistics, 47% of the population reported using at least one tobacco product, such as cigarettes, cigars, pipes, or hookahs, at least once in their lifetime, while 33.3% stated that they had used such products within the past year (Havaçeliği Atlam et al., 2020). This finding highlights the widespread impact of tobacco products on public health. In

recent years, electronic cigarettes, developed as an alternative to traditional smoking, have further exacerbated this issue.

Electronic cigarettes (e-cigarettes) are battery-operated devices that deliver nicotine and other addictive substances to users, mimicking the act of smoking (Yeh et al., 2022). The flavors used in e-cigarettes contribute to their pleasant aroma, leading individuals to perceive these products as "natural," "healthy," or "less harmful." This perception makes e-cigarettes particularly appealing to young people and adolescents. Indeed, research indicates that e-cigarette

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use is three times more prevalent among adolescents than adults (Dayi et al., 2019). However, the increasing prevalence of adverse health effects of e-cigarettes poses a significant public health concern. E-cigarettes have been reported to cause numerous health issues including dyspnea, coughing, lung cancer, paranasal cancers, chest pain, tachypnea, and tachycardia (Seiler-Ramadas et al., 2021). The rising rates of cigarette and e-cigarette use, coupled with the decreasing age of initiation, underscore the growing importance of tobacco control efforts.

Thirdhand smoke is defined as the absorption of particulate matter from tobacco smoke by surfaces such as furniture, clothing, and walls after smoking, followed by chemical reactions that transform these particles into a reinhalable form (Yeh et al., 2022). Additionally, thirdhand smoke components can re-enter the gas phase and disperse into air, leading to exposure through inhalation, skin contact, and ingestion (Yeh et al., 2022). However, common cleaning methods, such as opening windows, ventilating spaces, using fans or air conditioning, or wiping surfaces, are insufficient to prevent or eliminate thirdhand smoke (Önal et al., 2021).

The harmful effects of thirdhand smoke pose significant risks, particularly in children and adolescents. Studies suggest that thirdhand smoke can cause damage at the genetic level and pose serious risks for infants (Haardörfer et al., 2017). Therefore, raising awareness among children and adolescents regarding the effects of thirdhand smoke is of great importance. Furthermore, to promote a healthy lifestyle among adolescents, it is essential not only to encourage them to avoid tobacco products but also to support their participation in physical activities.

Physical activity (PA) is defined as “the entirety of movements that enable energy expenditure through the use of the musculoskeletal system in daily life” (Stricker et al., 2020). This concept is not limited to sports activities but is considered within a much broader framework. Daily life activities, such as walking, running, sports, games, work-related tasks, and exercises, can all be classified as physical activities. Physical activity is a fundamental element that meets biological, social, mental, and emotional needs. It plays a crucial role not only in maintaining physical health but also in preserving mental well-being. Studies have shown that participation in PA among adolescents contributes to weight control, reduces depression and anxiety, and improves the quality of life (Stricker et al., 2020; Tahir & Aslan, 2023). Despite the benefits of PA, the level of participation of children worldwide remains significantly low. It has been reported that participation in PA decreases during adolescence (ages 10–16), with this decline being more pronounced among girls (Watson et al., 2017).

Recent studies suggest a direct interaction between PA and thirdhand smoke exposure. The persistence of thirdhand smoke residues, particularly in enclosed environments where PA takes place, increases the level of exposure. This elevated exposure may adversely affect respiratory functions and consequently reduce an individual's physical performance (Hrubá & Žaloudíková, 2012). Although Elshazly et al. (2020)

note that the impact of passive smoke exposure on lung function is limited, they emphasize that its effects on PA cannot be entirely disregarded. Additionally, Acuff et al. (2015) suggest that thirdhand smoke may impair respiratory health, thereby indirectly reducing participation in PA.

According to the PA guidelines published by the World Health Organization in 2020, it is recommended that children and adolescents (ages 5–17) engage in at least 1 hour of moderate to vigorous PA daily. It has been noted that individuals who regularly participate in physical activities during childhood and adolescence are more likely to maintain this habit throughout their lives (Önal et al., 2021). Therefore, promoting participation in PA, particularly during young adulthood when habits are established, is of great importance. In this context, this study aimed to determine the levels of e-cigarette use and awareness of thirdhand smoke among adolescents, identify their motivations for participating in physical activities, and examine the relationships between these variables. This study is expected to make a significant contribution to the literature by helping to reduce potential future health risks, such as those associated with e-cigarette use, thirdhand smoke exposure, and lack of PA.

Material and Methods

The design of this study is a descriptive and cross-sectional study.

Sample

The universe of this study consists of 871 students who are actively studying in the fields of information technology, electrical-electronics, graphic design and photography, and accounting-finance in the 2024–2025 academic year at Mersin Yahya Gunsur Vocational and Technical Anatolian High School. In this study, the sample calculation method was not used; instead, the aim was to reach the entire universe by including students who were registered at the school and participated in the study voluntarily. First, the students were informed about the study, and data were collected from 657 students who agreed to participate in the study voluntarily.

Ethics Committee Approval and Informed Consent

The research was approved by the Suleyman Demirel University Social and Human Sciences Ethics Committee with the decision numbered 159/7 dated December 19, 2024. The necessary permissions for the institution where the research would be conducted were obtained with the application numbered MEB.TT.2025.015783 and dated January 10, 2025 to the Republic of Türkiye Ministry of National Education Research Implementation Permits Application and Evaluation Module. Detailed information about the study was given to the participants, and those who wanted to participate were asked to sign a detailed information form, a voluntary participation form, and a parental consent form. Additionally, permission to use the scale was obtained from the author via an email indicating the intent to use it.

Measures

Data were collected through a face-to-face survey conducted in classrooms between January and March 2025. The survey included the “Thirdhand Smoke Awareness Scale,” the “Motivation for Participation in Physical Activity Scale,” and questions regarding students’ attitudes toward e-cigarette use, as well as their socio-demographic information.

The Thirdhand Smoke Awareness Scale was developed by Haardörfer et al. (2017) and adapted into Turkish, with reliability and validity studies conducted by Önal et al. (2021). The 9-item scale consists of two dimensions: health effects and environmental persistence. It is scored on a 5-point Likert scale (1 = Strongly disagree to 5 = Strongly agree). The scale has a Cronbach’s alpha value of 0.71, with a minimum total score of 9 and a maximum total score of 45 (Haardörfer et al., 2017). Higher total scores indicate greater awareness of thirdhand smoke.

The Motivation for Participation in Physical Activity Scale developed by Tekkurşun-Demir and Cicioğlu (2018) consists of three subdimensions: individual, environmental, and amotivation. It includes 16 items and is scored on a 5-point Likert scale ranging from 1 (Strongly agree) to 5 (Strongly disagree). The scale has a Cronbach’s alpha value of 0.80, with a minimum score of 16 and a maximum score of 80. Higher scores indicate greater motivation to participate in physical activities (Demir, 2018).

Data Analysis

Data were analyzed using IBM SPSS Statistics version 26 (IBM SPSS Corp.; Armonk, NY, USA). Categorical variables were expressed as frequencies and percentages. For the numerical variables, normality was assessed by calculating skewness and kurtosis values (Table 1). According to the rules of normal distribution, skewness and kurtosis values should fall within a range of ± 2.0 (George & Mallery, 2010). Within this framework, all the scales and subdimensions presented in Table 1 demonstrate a normal distribution. Based on these results, parametric tests were employed for data with a normal distribution, including independent sample *t*-tests, one-way ANOVA, and Pearson correlation analysis. The correlation coefficient was interpreted as follows: 0.00–0.30 indicates a low-level relationship, 0.30–0.70 indicates a moderate-level relationship, and 0.70–1.00 indicates a high-level

relationship. Throughout the study, significance levels of 0.05 and 0.01 were used as thresholds for statistical significance (Büyükköztürk, 2020).

In this study, a reliability analysis was conducted for all scales and subdimensions, and the Cronbach’s alpha values are presented in Table 2. Reliability analysis reveals the consistency of all items within a scale or subdimension and their homogeneity in measuring the construct being examined. According to the reliability analyses, the α coefficient is expected to be above 0.60 (Pallant, 2020). Accordingly, the reliability of the scales and subdimensions used in this study was found to be sufficient.

Results

Of the participants, 79% were male, and 21% were female. The majority of participants were enrolled in the Information and Technology Department (47.9%), while ninth grade students (36.8%) constituted the largest group in terms of grade distribution. A total of 21.5% of the participants reported smoking. Among smokers, 21% were female ($N = 29$) and 79% were male ($N = 112$). Among the smokers, 43.3% consumed 9–16 cigarettes per day. The percentage of participants who attempted to quit smoking was 36.9%, whereas 27.7% expressed a desire to quit smoking. This discrepancy suggests that some individuals may have been compelled to attempt quitting due to health problems or external pressures rather than voluntarily. The rate of alcohol use among the participants was 19.9%, and the rate of e-cigarette use was 19.6%. Additionally, 58.4% of participants believed that e-cigarettes were addictive. The rate of hookah use was 31.8%, whereas the rate of cigar/pipe use was 23.4%. A total of 79.9% of participants lived with both parents. Regarding parental education levels, the highest proportion of mothers had secondary education (40.2%), and the highest proportion of fathers also had secondary education (49.3%). Among the participants, 90.7% did not have any chronic illnesses, and 65.9% reported their economic status as moderate. Furthermore, 60% of participants were exposed to cigarette smoke (Table 3).

Table 4 presents statistical information regarding the Motivation for Participation in Physical Activity Scale and the Thirdhand Smoke Awareness Scale, along with their subdimensions. The total mean score of the Motivation for Participation in Physical Activity Scale was calculated as 54.11

Table 1. Skewness and kurtosis values of the data

Scales and Dimensions	Skewness		Kurtosis	
	Statistics	Std. Error	Statistics	Std. Error
Motivation to Participate in Physical Activity Scale	0.038	0.095	0.631	0.190
Individual reasons	−0.658	0.095	0.128	0.190
Environmental reasons	−0.313	0.095	−0.148	0.190
Causelessness	−0.217	0.095	−0.801	0.190
Thirdhand Smoke Awareness Scale	−0.582	0.095	0.075	0.190
Health effects	−0.720	0.095	0.045	0.190
Persistence in the environment	−0.436	0.095	−0.436	0.190

Table 2. Reliability analysis results

Scales and Dimensions	Cronbach's Alpha
Motivation to Participate in Physical Activity Scale	0.750
Individual reasons	0.770
Environmental reasons	0.628
Causelessness	0.888
Thirdhand Smoke Awareness Scale	0.924
Health effects	0.874
Persistence in the environment	0.867

± 9.54 , with a minimum score of 16 and a maximum score of 80. Among the subdimensions of this scale, the mean score for the individual reasons dimension was 21.54 ± 5.08 (min: 6, max: 30), the mean score for the environmental reasons dimension was 19.93 ± 4.62 (min: 6, max: 30), and the mean score for the amotivation dimension was 12.65 ± 4.78 (min: 4, max: 20). The total mean score of the Thirdhand Smoke Awareness Scale was 32.44 ± 9.38 , with a minimum score of 9 and a maximum score of 45. For the subdimensions of this scale, the mean score for the health effects dimension was 18.37 ± 5.38 (min: 5, max: 25), and the mean score for the environmental persistence dimension was 14.07 ± 4.48 (min: 4, max: 20).

The results of the comparison of the Physical Activity Participation Motivation Scale and Thirdhand Smoke Awareness Scale and their subdimensions according to demographic characteristics are shown in Table 5. Based on the mean scores of the Motivation for Participation in Physical Activity Scale in terms of gender, significant differences were found in the subdimensions of environmental reasons ($p = .03$) and amotivation ($p = .015$). Male participants scored significantly higher on the environmental reasons subdimension, while female participants scored higher on the amotivation subdimension. Regarding the grade variable, a significant difference was found in the amotivation subdimension ($p = .004$). Ninth grade students scored significantly higher on the amotivation subdimension than students in the other grades. In terms of the mother's education level, significant differences were found in the total score of the Motivation for Participation in Physical Activity Scale ($p = .018$) as well as in the environmental factors ($p = .048$) and amotivation ($p = .001$) subdimensions. The children of mothers with secondary education scored significantly higher on the Motivation for Participation in Physical Activity Scale compared to the children of mothers who were illiterate. Additionally, the children of mothers with primary education scored higher in the environmental reasons subdimension compared to the children of mothers with secondary or university education. A significant difference was also found in the amotivation subdimension based on the mother's education level ($p = .001$). The children of mothers with secondary or university education scored significantly higher in the amotivation subdimension than the children of illiterate mothers. Regarding fathers' education level, significant differences were found in all subdimensions ($p < .05$). The children of fathers with

primary or secondary education scored significantly higher on the Motivation for Participation in Physical Activity Scale, as well as on the individual reasons, environmental reasons, and amotivation subdimensions, compared to the children of fathers who were illiterate.

In terms of health status, significant differences were found in the total score of the Motivation for Participation in Physical Activity Scale ($p = .001$), as well as in the individual reasons ($p = .001$) and amotivation ($p = .001$) subdimensions. Participants with good health status scored significantly higher on the Motivation for Participation in Physical Activity Scale and in the individual reasons subdimension than those with moderate or poor health status. Regarding the presence of chronic illness, significant differences were found in the total score on the Motivation for Participation in Physical Activity Scale ($p = .039$) and in the individual reasons subdimension ($p = .042$). Participants without chronic illnesses scored significantly higher on the Motivation for Participation in Physical Activity Scale and in the individual reasons subdimension than those with chronic illnesses.

In terms of regular exercise, significant differences were found in the total score of the Motivation for Participation in Physical Activity Scale ($p = .001$), as well as in the individual reasons ($p = .001$) and amotivation ($p = .001$) subdimensions. Participants who exercised regularly scored significantly higher on the Motivation for Participation in Physical Activity Scale, as well as on the individual reasons and amotivation subdimensions, compared to those who did not exercise regularly. Regarding alcohol consumption, significant differences were found in the total score of the Motivation for Participation in Physical Activity Scale ($p = .007$), as well as in the individual reasons ($p = .021$) and amotivation ($p = .001$) subdimensions. Participants who did not consume alcohol scored significantly higher on the Motivation for Participation in Physical Activity Scale, as well as on the individual reasons and amotivation subdimensions, compared to those who consumed alcohol.

In terms of smoking, significant differences were found in the total score of the Motivation for Participation in Physical Activity Scale ($p = .004$), as well as in individual reasons ($p = .005$) and amotivation ($p = .003$). Nonsmokers scored significantly higher on the Motivation for Participation in Physical Activity Scale, as well as on the individual reasons and amotivation subdimensions, compared to smokers. Regarding hookah use, significant differences were found in the total score of the Motivation for Participation in Physical Activity Scale ($p = .022$) as well as in the environmental factors ($p = .011$) and amotivation ($p = .001$) subdimensions. Participants who did not use hookah scored significantly higher on the Motivation for Participation in Physical Activity Scale, as well as on the environmental reasons and amotivation subdimensions, compared to those who used hookah. No significant differences were found in any subdimension based on the participants' field of study or the number of people they lived with ($p > .05$).

When examining the mean scores of the Thirdhand Smoke Awareness Scale in terms of variables, a significant difference

Table 3. Demographic findings of participants and their attitudes toward e-cigarettes

Variable	Category	N	%	Variable	Category	N	%
Gender	Female	138	21	Number of cigarettes smoked daily*	1–8	44	31.2
	Male	519	79		9–16	61	43.3
Department	Science and Technology	315	47.9		17 and more	36	25.5
	Electric and Electronics	161	24.5	Quitting smoking trial status*	Yes	52	36.9
	Graphics and Photography	83	12.6		No	89	63.1
	Accounting and Finance	98	14.9	Desire to quit smoking*	No	102	72.3
Class	9th class	242	36.8		Yes	39	27.7
	10th class	118	18	Hookah usage status	Yes	209	31.8
	11th class	127	19.3		No	448	68.2
	12th class	170	25.9	Cigar/pipe usage status	Yes	154	23.4
Parents' relationship status	Married	525	79.9		No	503	76.6
	Single	108	16.4	E-cigarette usage status	Yes	129	19.6
	Others	24	3.7		No	528	80.4
Mother's education status	Not literate	29	4.4	Social environment	No	232	35.3
	Primary education	257	39.1	E-cigarette usage status	Yes	425	64.7
	High school	264	40.2		Yes	384	58.4
	University	78	11.9	"E-cigarettes are addictive."	Partially	197	30
	Postgraduate	29	4.4		No	76	11.6
Father's education status	Not literate	11	1.7		Yes	230	35.2
	Primary education	215	32.7	"E-cigarettes are more harmful than cigarettes."	Partially	206	31.5
	High school	324	49.3		No	217	33.2
	University	86	13.1	"People use e-cigarettes to quit smoking."	Yes	210	32
	Postgraduate	21	3.2		Partially	233	35.5
Chronic disease status	No	596	90.7		No	213	32.5
	Yes	61	9.3	"E-cigarettes are an alternative to quitting smoking addiction."	Yes	201	30.6
Regular exercise status	Yes	271	41.2		Partially	198	30.1
	No	386	58.8		No	258	39.3
Economic situation	Good	173	26.3	"The sale of e-cigarettes is legal."	Yes	287	43.7
	Moderate	433	65.9		Partially	194	29.5
	Poor	51	7.8		No	176	26.8
State of health	Good	395	60.1	"The use of e-cigarettes is prohibited in closed areas."	Yes	353	53.7
	Moderate	236	35.9		Partially	170	25.9
	Poor	26	4		No	134	20.4
Place of residence	State dormitory/other	34	5.2	"E-cigarettes cause passive smoking."	Yes	335	51.3
	Family home	623	94.8		Partially	188	28.8
Number of people living	1–3 people	98	20		No	130	19.9
	4 people	185	37.8	"Using e-cigarettes is more expensive than smoking."	Yes	304	46.3
	5 people	122	24.9		Partially	191	29.1
	6 people and more	85	17.3		No	162	24.6
Alcoholic beverage drinking status	Yes	131	19.9	"E-cigarettes will replace cigarettes in the coming years."	Yes	268	40.8
	No	526	80.1		Partially	281	42.8
Smoking status	Yes	141	21.5		No	108	16.4
	No	516	78.5	Respiratory complaint status	No	570	86.8
Age of starting smoking*	10–13	51	36.2		Yes	87	13.2
	14	32	22.7	Presence of smokers in your close circle	No	179	27.2
	15–18	58	41.1		Yes	478	72.8
Years of smoking*	1 year	29	20.6	Exposure to cigarette smoke	Yes	394	60
	2 years	45	31.9		No	263	40
	3 years and more	67	47.5				

Participants provided only one response. There were no questions allowing multiple answers.

The dataset contains no missing values.

*21.5% of the participants using smoking (N = 141).

Table 4. Statistical information on subdimensions and components of scales

Scales and Dimensions	Mean	Standard Deviation	Minimum	Maximum
Motivation to Participate in Physical Activity Scale	54.11	9.54	16	80
Individual reasons	21.54	5.08	6	30
Environmental reasons	19.93	4.62	6	30
Causelessness	12.65	4.78	4	20
Thirdhand Smoke Awareness Scale	32.44	9.38	9	45
Health effects	18.37	5.38	5	25
Persistence in the environment	14.07	4.48	4	20

was found in the environmental persistence subdimension based on the mother's education level ($p = .041$). The children of mothers with primary education scored significantly higher on the scale compared to the children of mothers who were illiterate. Regarding fathers' education level, significant differences were found in all subdimensions ($p < .05$). The children of fathers with primary or secondary education scored significantly higher on the Thirdhand Smoke Awareness Scale, as well as on the health effects and environmental persistence subdimensions, compared to the children of fathers who were illiterate. In terms of regular exercise, a significant difference was found in the environmental persistence subdimension ($p = .04$). However, no significant differences were found in any subdimension of the Thirdhand Smoke Awareness Scale based on participants' gender, health status, chronic illness status, field of study, or number of people they lived with ($p > .05$).

The results of the correlation analysis conducted to determine the relationships between the Motivation for Participation in Physical Activity Scale, Thirdhand Smoke Awareness Scale, and their subdimensions are presented in Table 6. According to the analysis, significant and positive correlations were found between the Motivation for Participation in Physical Activity Scale and its subdimensions. Specifically, a very strong positive correlation was observed between the Motivation for Participation in Physical Activity Scale and the "individual reasons" subdimension ($r = 0.865, p < .01$), while a moderate positive correlation was found with the "environmental reasons" subdimension ($r = 0.676, p < .01$). Additionally, a moderate positive relationship was observed between the "amotivation" subdimension and the Motivation for Participation in Physical Activity Scale ($r = 0.423, p < .01$). When examining the relationships between the Thirdhand Smoke Awareness Scale, its subdimensions, and the Motivation for Participation in Physical Activity Scale, weak but significant positive correlations were found. Specifically, the "health effects" ($r = 0.154, p < .01$) and "environmental persistence" ($r = 0.136, p < .01$) subdimensions of the Thirdhand Smoke Awareness Scale showed weak positive correlations with the Motivation for Participation in Physical Activity Scale. Furthermore, significant relationships were identified between the subdimensions of the Thirdhand Smoke Awareness Scale and the Motivation for Participation in Physical Activity Scale. For example, a moderate positive correlation was found between "individual reasons" and "health effects" ($r = 0.242, p < .01$), as well as between "environmental reasons" and "environmental persistence" ($r = 0.331, p < .01$). On the

other hand, the "amotivation" subdimension was negatively correlated with the Thirdhand Smoke Awareness Scale and its subdimensions. Notably, significant negative correlations were observed between "amotivation" and "health effects" ($r = -0.211, p < .01$) and between "amotivation" and "environmental persistence" ($r = -0.266, p < .01$).

Discussion

Tobacco use is recognized as one of the most serious public health issues worldwide. According to the World Health Organization, more than eight million people die each year due to tobacco-related causes. In Türkiye, data from 2020 indicate that the prevalence of tobacco use is 32%, with a higher rate among men (42%) than women (19%). These figures highlight that tobacco use is widespread across society, particularly among men, where the rates are significantly higher. According to the Global Adult Tobacco Survey, 57.5% of tobacco users aged 15–34 reported starting tobacco use at or before the age of 15 (Republic of Türkiye Ministry of Interior Turkish National Police Counter Narcotics Department, 2014). This finding underscores that tobacco use often begins at an early age, placing young individuals at high risk of developing this habit. The findings of this study are consistent with those reported in the literature. In this study, 58.9% of smokers reported starting smoking before the age of 15. This result supports the notion that experimenting with smoking at an early age is a strong predictor of developing smoking habits in adulthood.

The age at which individuals are first introduced to smoking is a critical factor in shaping their smoking habits. The age at first exposure to cigarettes and initial smoking experience among students is of significant importance in this context. According to the literature, a study in Türkiye revealed that 50.9% of individuals were first introduced to smoking at the age of 11 years or younger, whereas 13.6% encountered smoking at the age of 12 (Yılmayan, 2020). The findings of this study align with these results, emphasizing the importance of initiating smoking awareness and educational programs as early as primary school. Furthermore, it is evident that these awareness efforts should continue throughout adolescence through appropriately designed programs. The results of the research show notable differences compared with other studies in the literature. For instance, the 2017 Global Youth Tobacco Survey for Türkiye reported that the prevalence of smoking among youth aged 13–15 was 7.7% overall, with 9.9% among boys and 5.3% among girls. In the same study,

Table 5. Comparison of scale and subdimensions according to demographic characteristics

Variable	Category	Motivation to Participate in Physical Activity Scale	Individual Reasons	Environmental Reasons	Causelessness	Thirdhand Smoke Awareness Scale	Health Effects	Persistence in the Environment
Gender	Female	53.51 ± 9.49	20.81 ± 5.13	19.17 ± 4.57	13.53 ± 4.47	31.71 ± 9.37	17.99 ± 5.39	13.72 ± 4.5
	Male	54.27 ± 9.56	21.73 ± 5.06	20.13 ± 4.62	12.42 ± 4.84	32.63 ± 9.38	18.47 ± 5.37	14.16 ± 4.47
Department	p	.404	.059	.03*	.015*	.308	.357	.303
	Science	54.05 ± 9.77	21.45 ± 5.22	19.58 ± 4.82	13.03 ± 4.45	31.71 ± 9.31	18.02 ± 5.37	13.7 ± 4.54
	Electric	54.39 ± 10.21	21.77 ± 5.25	20.18 ± 4.74	12.44 ± 5.2	33.26 ± 9.13	18.8 ± 5.27	14.46 ± 4.29
	Graphics	54.4 ± 8.19	21.58 ± 4.65	20.68 ± 4.01	12.14 ± 5.44	33.17 ± 10.21	18.83 ± 5.74	14.34 ± 4.83
	Finance	53.61 ± 8.82	21.4 ± 4.78	19.99 ± 4.19	12.22 ± 4.45	32.8 ± 9.2	18.39 ± 5.24	14.41 ± 4.23
Class	p	.92	.913	.211	.264	.287	.392	.232
	9th class	54.97 ± 9.97	21.61 ± 5.21	19.86 ± 4.6	13.5 ± 4.44A	31.47 ± 8.76	17.95 ± 5.16	13.52 ± 4.11
	10th class	53.6 ± 10.04	21.69 ± 4.93	20.08 ± 4.59	11.83 ± 4.96B	33.27 ± 9.36	18.9 ± 5.32	14.38 ± 4.37
	11th class	53.35 ± 8.95	21.14 ± 5.1	19.71 ± 4.9	12.5 ± 5.02B	32.74 ± 10.16	18.28 ± 5.69	14.46 ± 4.83
Mother's Education Status	12th class	53.83 ± 8.96	21.63 ± 5.03	20.08 ± 4.48	12.13 ± 4.79B	33.01 ± 9.59	18.66 ± 5.47	14.35 ± 4.74
	p	.355	.806	.888	.004**	.235	.374	.121
	Not literate	49.94 ± 10.66B	19.79 ± 5.67	18.64 ± 5.52B	11.51 ± 5.02B	29.43 ± 10.52	16.97 ± 5.89	12.46 ± 5.1B
	Primary education	53.71 ± 8.92B	21.55 ± 4.85	20.44 ± 4.29A	11.72 ± 4.72B	33.1 ± 9.5	18.53 ± 5.46	14.57 ± 4.37A
Father's education status	High school	55.22 ± 9.87A	21.89 ± 5.17	19.84 ± 4.79B	13.48 ± 4.75A	32.15 ± 9.38	18.2 ± 5.38	13.95 ± 4.53AB
	University	53.5 ± 9.56B	21.11 ± 5.2	19.25 ± 4.59B	13.14 ± 4.52A	32.37 ± 8.65	18.76 ± 5.01	13.61 ± 4.3AB
	p	.018*	.14	.048*	.001**	.212	.391	.041*
	Not literate	46.22 ± 12.3B	17.34 ± 6.81B	16.94 ± 4.93B	11.94 ± 4.59B	23.09 ± 8.75B	14 ± 5.98B	9.09 ± 3.33B
State of health	Primary education	54.18 ± 8.76A	21.83 ± 4.5A	20.71 ± 4.44A	11.64 ± 4.93B	32.8 ± 9.45A	18.5 ± 5.29A	14.31 ± 4.54A
	High school	54.9 ± 9.83A	21.76 ± 5.23A	19.91 ± 4.6A	13.22 ± 4.73A	32.78 ± 9.28A	18.58 ± 5.32A	14.2 ± 4.47A
	University	52.43 ± 9.43A	20.7 ± 5.34A	18.71 ± 4.6A	13.02 ± 4.36A	31.62 ± 9.16A	17.9 ± 5.52A	13.72 ± 4.22A
	p	.004*	.008**	.001*	.002**	.006**	.033*	.002**
Chronic disease status	Good	55.54 ± 10A	22.09 ± 5.1A	20.09 ± 4.6	13.36 ± 4.5A	31.88 ± 9	18.14 ± 5.23	13.74 ± 4.33
	Moderate	52.23 ± 8.1B	20.95 ± 4.8B	19.74 ± 4.4	11.54 ± 5B	33.51 ± 9.7	18.9 ± 5.46	14.61 ± 4.6
	Poor	49.53 ± 9.6B	18.48 ± 5.6C	19.04 ± 5.1	12.01 ± 4.4B	31.17 ± 11.31	16.94 ± 6.46	14.23 ± 5.14
	p	.001**	.001**	.4	.001**	.082	.086	.06
Regular exercise status	No	54.36 ± 9.4	21.67 ± 4.91	20.03 ± 4.58	12.66 ± 4.74	32.55 ± 9.14	18.47 ± 5.21	14.09 ± 4.4
	Yes	51.71 ± 10.62	20.28 ± 6.44	18.91 ± 4.94	12.53 ± 5.2	31.28 ± 11.48	17.39 ± 6.79	13.89 ± 5.19
	p	.039*	.042*	.071	.834	.312	.135	.745
	Yes	57.09 ± 10.64	22.85 ± 5.21	20.24 ± 4.9	14 ± 4.77	31.79 ± 8.92	18.15 ± 5.16	13.64 ± 4.44
Regular exercise status	No	52.02 ± 8.08	20.61 ± 4.79	19.71 ± 4.41	11.7 ± 4.56	32.89 ± 9.67	18.52 ± 5.52	14.37 ± 4.49
	p	.001**	.001**	.15	.001**	.139	.386	.04*

*p < .05. Different superscript letters indicate statistically significant differences between groups according to post-hoc comparisons (p < 0.05). Groups sharing the same letter are not significantly different. Bold values indicate statistically significant results).

**p < .01

Table 5. Continued

Variable	Category	Motivation to Participate in Physical Activity Scale	Individual Reasons	Environmental Reasons	Causelessness	Thirdhand Smoke Awareness Scale	Health Effects	Persistence in the Environment
Alcoholic beverage drinking status	Yes	52.1 ± 8.13	20.62 ± 5.27	20.12 ± 4.76	11.36 ± 5.31	33.49 ± 10.77	18.89 ± 6.1	14.6 ± 5.18
	No	54.62 ± 9.81	21.77 ± 5.02	19.88 ± 4.59	12.97 ± 4.59	32.17 ± 8.99	18.23 ± 5.18	13.94 ± 4.28
	p	.007**	.021*	.594	.001**	.149	.211	.13
Smoking status	Yes	52.08 ± 7.74	20.47 ± 5.07	20.01 ± 4.52	11.6 ± 4.96	31.89 ± 11.05	17.89 ± 6.27	14 ± 5.23
	No	54.67 ± 9.91	21.83 ± 5.05	19.9 ± 4.65	12.94 ± 4.69	32.59 ± 8.87	18.49 ± 5.11	14.09 ± 4.25
	p	.004**	.005**	.817	.003**	.437	.24	.828
Hookah usage status	Yes	52.86 ± 8.28	21.06 ± 5.06	20.6 ± 4.58	11.21 ± 5.19	33.21 ± 10.52	18.77 ± 5.95	14.44 ± 4.95
	No	54.7 ± 10.04	21.76 ± 5.09	19.61 ± 4.61	13.32 ± 4.42	32.07 ± 8.78	18.18 ± 5.08	13.9 ± 4.24
	p	.022*	.101	.011*	.001**	.147	.184	.15

*p < .05. Different superscript letters indicate statistically significant differences between groups according to post-hoc comparisons (p < 0.05). Groups sharing the same letter are not significantly different. Bold values indicate statistically significant results).

**p < .01

Table 6. Correlation levels between the motivation for participation in physical activity scale and the thirdhand smoke awareness scale and their subdimensions

Scale and Subdimensions	Factor	MPPAS	Individuals Reasons	Environmental Reasons	Causelessness	THSAS	Health Effects
Motivation for Participation in Physical Activity Scale	r	1					
Individuals reasons	p						
	r	0.865**	1				
	p	.001					
Environmental reasons	r	0.676**	0.599**	1			
	p	.001	.001				
	r	0.423**	0.084*	-0.253**	1		
Causelessness	p	.001	.031	.001			
	r	0.153**	0.237**	0.313**	-0.248**	1	
	p	.001	.001	.001	.001		
Thirdhand Smoke Awareness Scale	r	0.154**	0.242**	0.271**	-0.211**	0.960**	1
	p	.001	.001	.001	.001	.001	
	r	0.136**	0.205**	0.331**	-0.266**	0.941**	0.809**
Persistence in the environment	p	.001	.001	.001	.001	.001	.001
	r						
	p						

Note: MPPAS = Motivation for Participation in Physical Activity Scale; THSAS = Thirdhand Smoke Awareness Scale. *p < .05, **p < .01

smoking rates in Mersin for the 13–15 age group were 6.7% for boys and 4.9% for girls (Halk Sağlığı Genel Müdürlüğü, 2017). Additionally, data from the Turkish Monitoring Center for Drugs and Drug Addiction (TUBİM) indicate that the smoking rate among high school students nationwide is 8.3% (Republic of Türkiye Ministry of Interior, 2015). These findings highlight that the smoking prevalence varies by region and age group. Previous studies have also suggested that smoking and alcohol use rates change over time. For example, according to the 2008 Parliamentary Research Commission results in Türkiye, the smoking rate among high school students was 15.6% (21.8% for boys and 7.5% for girls), whereas the alcohol use rate was 16.5% (31.5% for boys and 10.6% for girls) (Metel et al., 2020). The higher prevalence of smoking and alcohol use observed in this study suggests an increasing trend in these behaviors among adolescents. However, it is important to note that this trend may be related to the characteristics of this study's target population, which consisted of vocational high school students. Indeed, the literature indicates that vocational high school students may have higher rates of substance use than science high school students (Yilmayan, 2020).

A nationwide study in Türkiye found that 67.6% of high school students who smoked were male, while 27.1% were female (Doğan & Ulukol, 2010). In this study, 79% of the students who smoked were male, and 21% were female. These findings indicated that smoking is more prevalent among male students. The study results show that smoking is more common among males. Similarly, in Jordan, the rates of starting to smoke and using are higher compared to females (Alzyoud et al., 2014). In a global study conducted in Bosnia and Herzegovina, 35% of males and only 16% of females smoked daily (Sekulic et al., 2012). In addition, Agaku et al. (2016) reported that the prevalence of smoking was significantly higher in males than in females between middle and high school.

In this study, the prevalence of e-cigarette use was 19.6%, which is a notably high rate compared with other studies in the literature. For instance, a study conducted in the United States with individuals aged ≥ 15 years reported an e-cigarette trial rate of 20.3% (Pearson et al., 2012). King et al. demonstrated that the rate of e-cigarette experimentation increased from 3.3% in 2010 to 8.5% in 2013 (King et al., 2013). The higher prevalence of e-cigarette use in this study suggests that it is becoming increasingly common among youth and represents a growing public health concern. When considered alongside the finding that 63.1% of students in this study had never attempted to quit smoking, e-cigarettes appeared to be perceived as an alternative to traditional cigarettes. This perception is becoming more widespread, with some smokers viewing e-cigarettes as a tool to quit smoking. In the literature, 75% of users believe that e-cigarettes can help reduce smoking, while 45%–85% believe they can aid in quitting smoking. Additionally, 53%–80% perceive e-cigarettes as less harmful than traditional cigarettes, and 26% believe they are less addictive (Köseoğlu et al., 2014). In this study, 32% of the students stated that e-cigarettes could help with smoking cessation, 30.6% viewed them as an alternative for combating nicotine addiction, and 35% believed e-cigarettes were less

harmful than traditional cigarettes. These findings indicate that perceptions of e-cigarettes are widespread among young people and may contribute to the increasing prevalence of e-cigarette use.

Despite the widespread perception that e-cigarettes may reduce health risks, these beliefs can be misleading when considering their actual health effects. Studies have identified harmful substances in e-cigarette vapor that can cause lung diseases and cancer. Nevertheless, the belief that e-cigarettes pose fewer health risks remains. In this study, the influence of social environment as a source of e-cigarette awareness was found to be 64.7%. This finding highlights the significant role of peers and social surroundings in increasing the prevalence of e-cigarette use. The presentation of e-cigarettes, their variety of flavor options, and their perception as technological products have been influential factors in their appeal to young people (Özlü, 2025; Pearson et al., 2012). There is growing concern regarding the increasing prevalence of e-cigarette use in Türkiye (Havaçeliği Atlam et al., 2020). Given these trends, it would be beneficial to implement protective educational programs targeting adolescents who are particularly at risk of e-cigarette use.

Cigarettes are known to contain approximately 7000 chemical substances, 69 of which are classified as carcinogenic. Smoking not only harms active smokers but also negatively affects individuals who are passively exposed to cigarette smoke. Individuals aged 15 years and older are frequently exposed to secondhand smoke in public spaces, such as government buildings, restaurants, and cafes (Hacettepe Üniversitesi, Halk Sağlığı Anabilim Dalı, 2016). In this study, exposure to cigarette smoke was 60%. This finding underscores that smoking is not merely an individual issue, but also a significant environmental and societal public health problem. The high prevalence of passive smoke exposure highlights the urgent need for stricter regulations and public health interventions to protect nonsmokers from the harmful effects of secondhand smoke.

Another critical aspect of cigarette smoke is thirdhand smoke exposure. Research has shown that thirdhand smoke can persist in smoking households for up to 6 months, during which exposure to toxic chemicals continues (Arfaeina et al., 2023). This highlights the indirect, yet significant, threats that cigarette smoke poses to human health through environmental contamination. In this study, differences in the subdimensions and total scores of the Thirdhand Smoke Awareness Scale were found to be associated only with the educational level of the parents. This result suggests that, as knowledge levels increase, awareness of thirdhand smoke also improves. Therefore, promoting education and awareness campaigns could play a vital role in mitigating the risks associated with thirdhand smoke.

A review of the literature reveals that, unlike the findings of this study, women tend to have higher average scores on thirdhand smoke awareness scales than men. However, these studies typically focused on adults or parents as their sample population (Köseoğlu et al., 2014; Seiler-Ramadas et al.,

2021). In contrast, the study found no significant difference in scale scores between sexes among adolescents ($p > .05$). Considering that the possible scores on the scale range from 9 to 45, it can be stated that high school students' awareness of thirdhand smoke was above average. Although research on thirdhand smoke is limited, it remains a topic that is not widely understood by the public (Mahabee-Gittens et al., 2021; Wen et al., 2022). The literature suggests that older individuals, men, those with lower income levels, smokers, and individuals living in secondhand homes that have not been renovated tend to have less knowledge of the harmful effects of thirdhand smoke (Xie et al., 2021). This study highlights the importance of parental education levels in thirdhand smoking awareness. This finding suggests that parents' educational backgrounds may indirectly contribute to their children's level of awareness.

In this study, engaging in regular exercise significantly influenced the "environmental persistence" subdimension of the Thirdhand Smoke Awareness Scale ($p < .05$). This finding suggests that PA may not only contribute to physical health but also play a role in enhancing environmental awareness and understanding the effects of cigarette smoke. Based on this, educational programs aimed at increasing students' awareness and knowledge of thirdhand smoke could be developed.

The literature includes various studies examining the factors affecting students' motivation to participate in PA. In these studies, no significant differences were found in students' motivation for PA participation based on grade level (Bozkurt & Tamer, 2020; Kahiyah, 2020; Türkeli & Namlı, 2019). However, another study reported that tenth grade students were more motivated to participate in PA than twelfth- and ninth-grade students (Demir, 2018).

In this study, ninth grade students scored significantly higher in the "amotivation" subdimension compared to other grades. Although no significant differences were found in the other subdimensions, the overall motivation scores for PA participation decreased as the grade level increased. This decline can be attributed to twelfth grade students focusing more on university entrance exam preparation, spending more sedentary time, and experiencing decreased intrinsic motivation. These variations in the literature suggest that high school students' behaviors are multifactorial and influenced by factors such as the social environment, societal characteristics, socioeconomic status, and individual differences (Türkeli & Namlı, 2019).

This study also found no significant difference in total motivation scores for PA participation between male and female students. However, in the "environmental reasons" subdimension, male students scored higher than female students. This indicates that male students are more motivated by environmental factors such as gaining recognition at school, improving relationships with school administrators and teachers, and demonstrating their peers' abilities. Similar findings in the literature suggest that male students have significantly higher PA levels than female students (Bozkurt & Tamer, 2020; Kudaş et al., 2005). However, contrary to the findings, some studies have reported no significant

differences in PA levels or motivation scores between male and female students (Demir, 2018; Demir et al., 2017). These discrepancies highlight the complex and multifaceted nature of PA behaviors among high school students, which are influenced by a variety of social, cultural, and individual factors.

In this study, it was found that students who engaged in regular exercise exhibited significantly higher motivation for participation in PA in both subdimensions of the scale than those who did not exercise. The positive effects of participation in PA among adolescents have been demonstrated in numerous studies. For instance, one study Chen et al. (2020) reported a positive relationship between life satisfaction and PA, indicating that adolescents who participate in more physical activities have higher levels of life satisfaction. The findings of this study align with these results, showing that students who engage in regular exercise are more motivated to participate in PA and tend to maintain this habit. In the general population, it is well established that regular exercise positively affects physical fitness, including the capacity to lead an active lifestyle, improvements in aerobic endurance, and increased muscle strength, all of which are critical for health (Stricker et al., 2020). This study supports these findings, demonstrating that students who exercise regularly are more motivated to participate in PA and to maintain this behavior over time.

This study found that the mother's education level significantly influenced the motivation for participation in PA. Specifically, as the mother's education level increases, the scores in the "amotivation" subdimension decrease significantly ($p = .001$). Children of mothers with secondary or university education had lower amotivation scores than those of illiterate mothers. This indicates that a mother's education level plays a crucial role in encouraging children to engage in PA. Similarly, fathers' education level was also found to have a significant impact on their motivation for PA. As fathers' education levels increase, they are more likely to encourage their children to participate in physical activities, leading to more active lifestyles. This finding underscores the influence of parental education on children's PA habits. Additionally, the results of the Thirdhand Smoke Awareness Scale further supported the importance of parental education in fostering awareness.

The relationship between motivation to participate in PA and awareness of thirdhand smoke was also explored in this study. These findings indicate that motivation for PA is strongly associated with individual and environmental reasons, while the perception of amotivation negatively affects this motivation. Additionally, a weak but positive relationship was found between thirdhand smoking awareness and PA motivation. This suggests that participation in PA may not only promote individual health behaviors but also enhance environmental awareness.

In conclusion, this study highlights that smoking and e-cigarette use are growing public health concerns among the youth. E-cigarettes are perceived as an appealing alternative for young people, and social environments reinforce this

perception. It was observed that as parents' education levels increased, their awareness of thirdhand smoke also increased. Additionally, students who engaged in regular exercise exhibited higher motivation for PA, and nonsmokers were more willing to participate in physical activities. A weak but positive relationship was found between motivation for participation in PA and awareness of thirdhand smoke. To reduce cigarette and e-cigarette use, promote PA, and raise awareness of thirdhand smoke, the Ministry of Health and relevant policy-making institutions should develop multi-component intervention programs that encourage youth to avoid tobacco products. In this context, it is recommended to implement educational programs in schools, encourage sports activities, conduct awareness campaigns for parents, use effective communication strategies that emphasize the harms of e-cigarettes, and strengthen legal regulations.

Limitations and Directions/Suggestions for Future Research

This study had several limitations. First, it was conducted exclusively with students enrolled at Mersin Yahya Günsur Vocational and Technical Anatolian High School during the 2024–2025 academic year; therefore, the findings cannot be generalized to all high school students. Additionally, as the study was based on voluntary participation, it was assumed that the participants evaluated the scale items subjectively. Since this study was limited to a specific high school, it is recommended that similar studies be conducted with larger samples from different cities and schools in future studies. In this way, the generalizability of the findings will increase. In addition, the study used only a survey as a quantitative data collection tool. In future studies, the addition of qualitative data collection methods (e.g., interviews or focus group studies) may provide more in-depth information about students' Instagram use and social appearance concerns.

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Author contributions

Conception and design: B.S., Y.S.; Data acquisition: B.S., Y.S.; Data analysis: B.S., Y.S.; Data interpretation: B.S.; Drafting of the manuscript: B.S.; Critical revision of the manuscript: B.S., Y.S. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Süleyman Demirel University Social and Human Sciences Ethics Committee (Date: December 19, 2024, Decision/Protocol No: 159/7). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Acuff, L., Fristoe, K., Hamblen, J., Smith, M., & Chen, J. (2015). Third-hand smoke: Old smoke, new concerns. *Journal of Community Health, 41*(3), 680–687. [\[Crossref\]](#)
- Agaku, I. T., Singh, T., Rolle, I., Olalekan, A. Y., & King, B. A. (2016). Prevalence and determinants of secondhand smoke exposure among middle and high school students. *Pediatrics, 137*(2), e20151985. [\[Crossref\]](#)
- Alzyoud, S., Kheirallah, K. A., Weglicki, L. S., Ward, K. D., Al-Khawaldeh, A., & Shotar, A. (2014). Tobacco smoking status and perception of health among a sample of Jordanian students. *International Journal of Environmental Research and Public Health, 11*(7), 7022–7035. [\[Crossref\]](#)
- Arfaeina, H., Ghaemi, M., Jahantigh, A., Soleimani, F., & Hashemi, H. (2023). Secondhand and thirdhand smoke: A review on chemical contents, exposure routes, and protective strategies. *Environmental Science and Pollution Research International, 30*(32), 78017–78029. [\[Crossref\]](#)
- Bozkurt Mutlu, T., & Tamer, K. (2020). Motivation level for participation in physical activity. *Gaziantep University Journal of Sports Sciences, 5*(3), 286–298.
- Büyüköztürk, Ş. (2020). *Handbook of data analysis for social sciences* (27th ed.). PEGEM Publications.
- Chen, S., Ho, W. K. Y., & Ahmed, M. D. (2020). Physical activity and its relationship with life satisfaction among middle school students: A cross-culture study. *Sustainability, 12*(17), 6932. [\[Crossref\]](#)
- Dayi, A., Kahraman, S., & Korkut, S. E. (2019). Attitudes of electronic cigarette users toward e-cigarettes and their daily usage habits. *Journal of Addiction, 20*(1), 32–39.
- Demir, G. T. (2018). Physical Activity Participation Motivation Scale: Validity and reliability study. *International Journal of Human Science, 15*(4), 2480–2492.
- Demir, G. T., Namli, S., & Türkeli, A. (2017). Investigation of the relationship between digital game addiction and physical activity levels of secondary school students. *Niğde University Journal of Physical Education and Sports Sciences, 11*(3), 234.

- Doğan, D. G., & Ulukol, B. (2010). Factors affecting adolescents' smoking and the effectiveness of two anti-smoking education models. *İnönü University Faculty of Medicine Journal*, 17(3), 179-185.
- Elshazly, F. A., Abdelbasset, W. K., Elnaggar, R. K., & Tantawy, S. A. (2020). Effects of second-hand smoking on lung functions in athlete and non-athlete school-aged children - Observational study. *African Health Sciences*, 20(1), 368-375. [\[Crossref\]](#)
- George, D., & Mallery, M. (2010). *SPSS for Windows step by step: A simple guide and reference* (10th ed.). Pearson.
- Haardörfer, R., Berg, C. J., Escoffery, C., Bundy, L. T., Hovell, M., & Kegler, M. C. (2017). Development of a scale assessing Beliefs about ThirdHand Smoke. *Tobacco Induced Diseases*, 15(1), 4. [\[Crossref\]](#)
- Hacettepe Üniversitesi, Halk Sağlığı Anabilim Dalı. (2016). *Küresel yetişkin tütün araştırması; Türkiye 2016 verileri*. <http://www.halksagligi.hacettepe.edu.tr/duyurular/halkayonelik/kyta2016.pdf>
- Halk Sağlığı Genel Müdürlüğü. (2017). *Küresel gençlik tütün araştırması hakkında*. <https://hsgm.saglik.gov.tr/tr/haberler-3/k%C3%BCresel-gen%C3%A7lik-t%C3%Bct%C3%BCn-ara%C5%9F%C4%B1rmas%C4%B1-hakk%C4%B1nda.html>
- Havaçeliği Atılam, D., Şaşman Kaylı, D., & Yaraş, G. (2020). Attitudes toward electronic cigarette use and usage characteristics: The İzmir sample. *Journal of Addiction*, 21(4), 297-307.
- Hrubá, D., & Žaloudíková, I. (2012). What limits the effectiveness of school-based anti-smoking programmes? *Central European Journal of Public Health*, 20(1), 18-23. [\[Crossref\]](#)
- Kahiyah, A. M. H. (2020). *Arap okullarında okuyan öğrencilerin fiziksel aktiviteye katılım motivasyon düzeylerinin bazı değişkenlere göre karşılaştırılması* (Thesis No. 646572) [Master's thesis, Gazi University]. Council of Higher Education National Thesis Center.
- King, B. A., Alam, S., Promoff, G., Arrazola, R., & Dube, S. R. (2013). Awareness and ever-use of electronic cigarettes among U.S. adults, 2010-2011. *Nicotine & Tobacco Research: Official Journal of the Society for Research on Nicotine and Tobacco*, 15(9), 1623-1627. [\[Crossref\]](#)
- Köseoğlu, E., Uğur, F., Saraymen, R., Canatan, H., & Coşkun, A. (2014). An objective perspective on electronic cigarette use. *Cukurova Medical Journal*, 39(3), 572-580.
- Kudaş, D. S., Ülkar, D. B., Erdoğan, D. A., & Esraçırçı, D. (2005). Physical activity and certain nutritional habits of 11-12-year-old children in Ankara. *Journal of Sports Sciences*, 16(1), 19-29.
- Mahabee-Gittens, E. M., Quintana, P. J. E., Hoh, E., Merianos, A. L., Stone, L., Lopez-Galvez, N., & Matt, G. E. (2021). Collecting hand wipe samples to assess thirdhand smoke exposure. *Frontiers in Public Health*, 9, 770505. [\[Crossref\]](#)
- Mete, B., Söyler, V., & Pehlivan, E. (2020). Prevalence of smoking and substance use in adolescents. *Journal of Dependence*, 21(1), 64-71.
- Önal, Ö., Evcil, F. Y., Eroğlu, H. N., & Kişioğlu, A. (2021). Validity and reliability study of the Turkish version of the Third-Hand Smoke Awareness Scale. *Medical Journal of Süleyman Demirel University*, 28(3), 499-506.
- Özlü, T. (2025). Other highlights and new products on the agenda: E-cigarettes/electronic nicotine delivery systems. *ADDICTA: The Turkish Journal on Addictions*, 12(1), 10-19. [\[Crossref\]](#)
- Pallant, J. (2020). *SPSS survival manual* (3rd ed., S. Balci & B. Ahi, Trans.). Ani Publications.
- Pearson, J. L., Richardson, A., Niaura, R. S., Vallone, D. M., & Abrams, D. B. (2012). e-Cigarette awareness, use, and harm perceptions in US adults. *American Journal of Public Health*, 102(9), 1758-1766. [\[Crossref\]](#)
- Republic of Türkiye Ministry of Interior Turkish National Police Counter Narcotics Department. (2014). *2015 Turkish national drug report (2014 data)*. <https://www.narkotik.pol.tr/kurumlar/narkotik.pol.tr/Arsiv/TUBIM/Documents/2015%20TURKISH%20NATIONAL%20DRUG%20REPORT.pdf>
- Seiler-Ramadas, R., Sandner, I., Haider, S., Grabovac, I., & Dorner, T. E. (2021). Health effects of electronic cigarette (e cigarette) use on organ systems and its implications for public health. *Wiener Klinische Wochenschrift*, 133(19-20), 1020-1027. [\[Crossref\]](#)
- Sekulic, D., Ostojic, M., Ostojic, Z., Hajdarevic, B., & Ostojic, L. (2012). Substance abuse prevalence and its relation to scholastic achievement and sport factors: An analysis among adolescents of the Herzegovina-Neretva Canton in Bosnia and Herzegovina. *BMC Public Health*, 12, 274. [\[Crossref\]](#)
- Stricker, P. R., Faigenbaum, A. D., & McCambridge, T. M. (2020). Resistance training for children and adolescents. *Pediatrics*, 145(6), e20201011. [\[Crossref\]](#)
- Tahir, İ., & Aslan, V. (2023). Examination of high school students' motivation for participation in physical activity. *Journal of Global Sport and Education Research*, 6(2), 40-53.
- Tekkurşun-Demir, G., & Cicioğlu, H. İ. (2018). Physical Activity Participation Motivation Scale (PAPMS): Validity and reliability study. *International Journal of Human Sciences*, 15(4), 2479-2492.
- Türkeli, A., & N. S. (2019). Examination of physical activity motivations of physical education and sports department students. 4th International Congress of Social Sciences (pp. 12-19).
- Watson, A., Timperio, A., Brown, H., Best, K., & Hesketh, K. D. (2017). Effect of classroom-based physical activity interventions on academic and physical activity outcomes: A systematic review and meta-analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 14(1), 114. [\[Crossref\]](#)
- Wen, Q., Wang, X., Lv, J., Guo, Y., Pei, P., Yang, L., Chen, Y., Du, H., Burgess, S., Hacker, A., Liu, F., Chen, J., Yu, C., Chen, Z., & Li, L. (2022). Association between involuntary smoking and risk of cervical cancer in Chinese female never smokers: A prospective cohort study. *Environmental Research*, 212(C), 113371. [\[Crossref\]](#)
- Xie, Z., Chen, M., Fu, Z., He, Y., Tian, Y., Zhang, X., & Feng, N. (2021). Thirdhand smoke beliefs and behaviors among families of primary school children in Shanghai. *Tobacco Induced Diseases*, 19, 10. [\[Crossref\]](#)
- Yeh, K., Li, L., Wania, F., & Abbatt, J. P. D. (2022). Thirdhand smoke from tobacco, e-cigarettes, cannabis, methamphetamine and cocaine: Partitioning, reactive fate, and human exposure in indoor environments. *Environment International*, 160, 107063. [\[Crossref\]](#)
- Yilmayan, A. (2020). Prevalence of narcotic substance use among 10th-12th grade students in the central district of Van Province. *ISPEC International Journal of Social Sciences & Humanities*, 4(3), 183-211.

Motivational interviewing on smoking cessation decisions of university students in Türkiye: A randomized controlled trial

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Abstract

The study aims to examine the effect of the motivational interviewing intervention on smoking cessation decisions among university students in Türkiye. The study was conducted with the participation of 64 firstyear university students (experimental group 32, control group 32) who were smokers and wanted to quit. Motivational interviews were completed with students in the experimental group based on quitting smoking (first interview, first month, and third month). Data collection comprised the first interview and the interviews on the first, third, and sixth months, performed on the experimental and control groups using five scales. The team determined that the smoking cessation rate of the students in the experimental group (37.6%) was four times higher than that of the control group (9.4%). A significant difference was found when comparing the smoking cessation status of students according to the follow-ups in the experimental and control groups. In the study, students in the experimental group progressed toward moving to the next stage in the stages of behavior change, aiming at smoking cessation. In contrast, in the control group, there were reversals. Motivational interviewing increases students' smoking cessation rates and provides positive progress in the stages of behavior change, aiming at smoking cessation.

Keywords: motivational interviewing, nurse, smoking cessation, student

Main points

- Motivational interviewing increases students' smoking cessation rates and provides positive progress in the stages of behavior change, aiming at smoking cessation.
- The cessation rate of the experimental group who underwent motivational interviewing was four times higher than that of the control group.
- In the study, students in the experimental group progressed toward moving to the next stage in the stages of behavior change, aiming at smoking cessation, while in the control group, there were reversals.

Introduction

According to the World Health Organization (WHO, 2020), tobacco use is a public health problem that causes the preventable death of over eight million people in the world every year (WHO, 2020). The disease burden of this problem, which is an inducer of non-communicable but early

preventable diseases, is greater than that of many epidemics. Many diseases, particularly respiratory diseases, are more severe in individuals due to smoking and exposure to passive smoking, which negatively affects health. It is reported that about a billion people will die in the 21st century due to the use of tobacco and its products if urgent measures are not taken to prevent, reduce, and stop their use (Hsu et al., 2020; WHO,

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2020). About 1.2 billion people over the age of 15 worldwide and 19.2 million people in Türkiye use tobacco products. According to the data from the Türkiye Health Survey, the rate of daily tobacco smokers increased from 26.5% in 2016 to 28% in 2019 in individuals aged 15 years and older (Turkish Statistical Institute, 2020). The rate of smoking is also increasing in the young population. In studies conducted with university students in Türkiye, it has been found that smoking rates vary between 25% and 60% (Merih et al., 2021).

The university years are a new physical, social, emotional, and intellectual period in which the transition to young adulthood and cognitive, social, and emotional changes are experienced. During this period, young people may prefer smoking, alcohol, and substance use as coping methods. For this reason, young people are at risk in terms of addictive substance use, and studies on prevention and cessation are necessary (WHO, 2020).

It is observed that more than half of smokers globally want to quit smoking, but their cessation rate is low, between 3% and 12% (Asma et al., 2015; O'Leary & Polosa, 2020). There is great importance in interventions for smoking cessation in all accessible areas in terms of protecting and improving the health of young people, who are more reluctant to seek and request treatment for quitting smoking than adults (Müssener et al., 2016; Pardavila-Belio et al., 2019; WHO, 2020). In addition to pharmacological treatment during the cessation process, initiatives to ensure behavioral changes in individuals increase smoking cessation rates (Ögel & Şimşek, 2021; Sayed et al., 2023; Terzi et al., 2019; Terzi et al., 2023; WHO, 2020).

The trans-theoretical model (TTM) is an integrative, biopsychosocial model used to conceptualize the intentional behavior change process and ensures that the individual is ready to act on healthy behavior (Prochaska & Norcross, 2018). It is important to determine the individual's stages of behavior change in the model (He et al., 2022).

Motivational interviewing (MI) is an individual method that helps to solve the problem by revealing ambivalence (conflicting emotions) for behavior change. It is necessary to focus on a person's actions rather than on his words because a person may say that he wants to quit smoking, but he cannot take action (Prochaska & Norcross, 2018; Ögel & Şimşek, 2021). The failure of treatment attempts that force the user to quit addiction reveals the importance of MI and allows people to understand their problems and take action for change (Kumar et al., 2022). The meta-analysis of MI on smoking cessation in university students worldwide determined that MI is positively effective in smoking cessation (Dereli et al., 2023). In MI, the interviewer and the counselee need to move forward together for the commencement and continuity of change.

Lindson-Hawley et al. (2015) stated that, according to the studies they examined on smoking habits, the MI intervention performed by physicians, nurses, and psychological counselors

in the form of different sessions provides a high rate of smoking cessation compared to procedural treatment and brief information transfers. From a public health perspective, health personnel, especially public health nurses working in primary health care institutions and school health nurses in educational institutions, have important duties to protect and improve the health of individuals and society (WHO, 2020; Kumar et al., 2022). It has been determined that the professional knowledge and skills of the MI interviewer, as well as the knowledge and competencies related to MI techniques and applications, are more effective in creating behavioral change (Ögel & Şimşek, 2021).

In addition to MI, an effective method for behavior change, and the assessment of young people's smoking rate status, individual-specific behavioral treatments and interviews should be conducted. Although the necessity and importance of conducting studies aimed at the young population in the fight against tobacco are emphasized, interventional studies aimed at quitting are limited. It was observed that next to the motivational interview for young people to give up smoking, support is provided in the form of educational materials such as brochures and booklets, mobile text messages, and mobile apps (Sayed et al., 2023; Gill et al., 2022; Müssener et al., 2016; Pardavila-Belio et al., 2019; Taş et al., 2016). While examining the multiple and different applications identified in the literature, the lack of a study that only examines the effect of MI stands out, a case that Lindson et al. (2019) also highlighted.

Study Aim

This study aimed to examine the effect of individual motivational interviews applied by a public health nurse to university students who smoke on their decisions to quit smoking.

Material and Methods

Design

This study is a semi-experimental, randomized controlled, open-label interventional study conducted to analyze the effectiveness of MI on smoking cessation decisions in university students.

Participants did not have any information about whether they were included in the experimental or control group. Group assignment was made by the research team using a random number table, and this information was not provided to the participants. The form of the interviews (duration, environment, content structure) was standardized; thus, motivational interviews applied to the experimental group were prevented from being distinguished.

Interviews conducted in an online/hybrid environment due to the pandemic process limited the interaction between the groups. Since the experts implementing the study (e.g., nurse researcher) had group knowledge, a blind structure was not possible.

Setting and Sample

The research sample comprised first-year students ($N: 4543$) enrolled in the 2021 academic year. An announcement was made to first-year students via the İzmir Katip Çelebi University. The sample group comprised students aged 18 years and older who wanted to participate in the study, wanted to quit smoking, had not been diagnosed with depression, and had a low Beck depression score ($n:478$). Only individuals with a Beck Depression Inventory (BDI) score between 10 and 16, i.e., individuals with mild depression, were included in the study. Individuals with a moderate or severe depression score ($BDI \geq 17$), or those with a previous psychiatric diagnosis, were excluded from the study ($n:100$). Students who took a course from the research team members were also excluded due to influenceability ($n:20$). In this study, the sample size was calculated based on the difference in self-efficacy scores between the experimental and control groups to evaluate the effect of MI. The calculation was conducted in line with the findings from the pilot study and similar studies in the literature (Gill et al., 2022; Taş et al., 2016). The parameters used in the calculation were as follows:

- Effect size (Cohen's d): 0.49

This value was determined based on the group means and standard deviations obtained from the pilot study and similar findings reported in the literature. It was considered a medium effect size.

- Significance level (α): 0.05

A standard 5% error margin was preferred for two-tailed hypothesis testing.

- Statistical power ($1-\beta$): 83.83%

This level of power was chosen to reduce the risk of Type 2 error and to increase the likelihood of detecting a statistically significant difference.

The self-efficacy and competence score effect size between the experimental and control groups was calculated using stratified PASS 11 (Power Analysis Sample Size) in 358 students who met all the criteria as 0.49, the margin of error as 0.05, the power as 83.83% and the sample size of each group as $n:23$ students (Edwards, 1993). However, considering the potential loss of participation and follow-up during the COVID-19 pandemic, $n:40$ students were included in each group at the beginning of the study. With this increased number, the

statistical power was raised to 93.26%. The students included in the study were divided into an experimental and a control group using a simple random sampling technique according to a randomized table of numbers. The students participating in the study were not given group information to ensure blindness. In addition, since the study was conducted during the online learning process, there were no intra-group and inter-group interactions among the students.

Application of the Research and Collection of Data

The Consolidated Standards of Reporting Trials flow diagram is shown in Figure 1. Preliminary, first-month, third-month, and sixth-month interviews were conducted with students in the experimental and control groups in the research between April 2021 and December 2021.

In the study, in order to minimize contact between the experimental and control groups, the groups were followed up at different time intervals and in different research environments after random assignment. The interviews were conducted online (on the Zoom platform) and face-to-face with a hybrid interview method in line with the feasibility of education and training during the pandemic. Intervention interviews were conducted individually and confidentially for the experimental group, while only standard information was provided to the control group. Therefore, the control group can be classified as a passive waiting list condition. In addition, students participating in the study were asked not to share the content and processes of the research with other participants. Participants were included in the study within an institutional framework, but all external variables could not be fully controlled. Non-intervention interactions (e.g., out-of-group information, social influences) were tried to be reduced.

Individual motivational interviews based on the behavior change model (MI) (each interview lasted 20–40 minutes on average) were applied to the students in the experimental group. The MIs were planned and implemented according to the stages of change to increase students' motivation. According to the stages of change, the perception of the importance of quitting smoking, the individual's belief in the possibility of change, were tried to be strengthened, and a quit plan was made. The interviews were conducted by an academic researcher who was trained in MI, using the OARS technique (Open-ended questions, Affirmation, Reflective listening, and Summarization) together with the stages of change model (Prochaska & Norcross, 2018). The programme encompassed the following areas: the establishment of interpersonal relationships and the cultivation of trust; the identification of conflicts; the assessment of the level of readiness for change; the promotion of change discourse; the establishment of objectives and planning; and the enhancement of self-sufficiency. In order to ensure that the interviews were conducted in accordance with the principles of MI, a structured interview form was employed, and regular supervision was provided throughout the process.

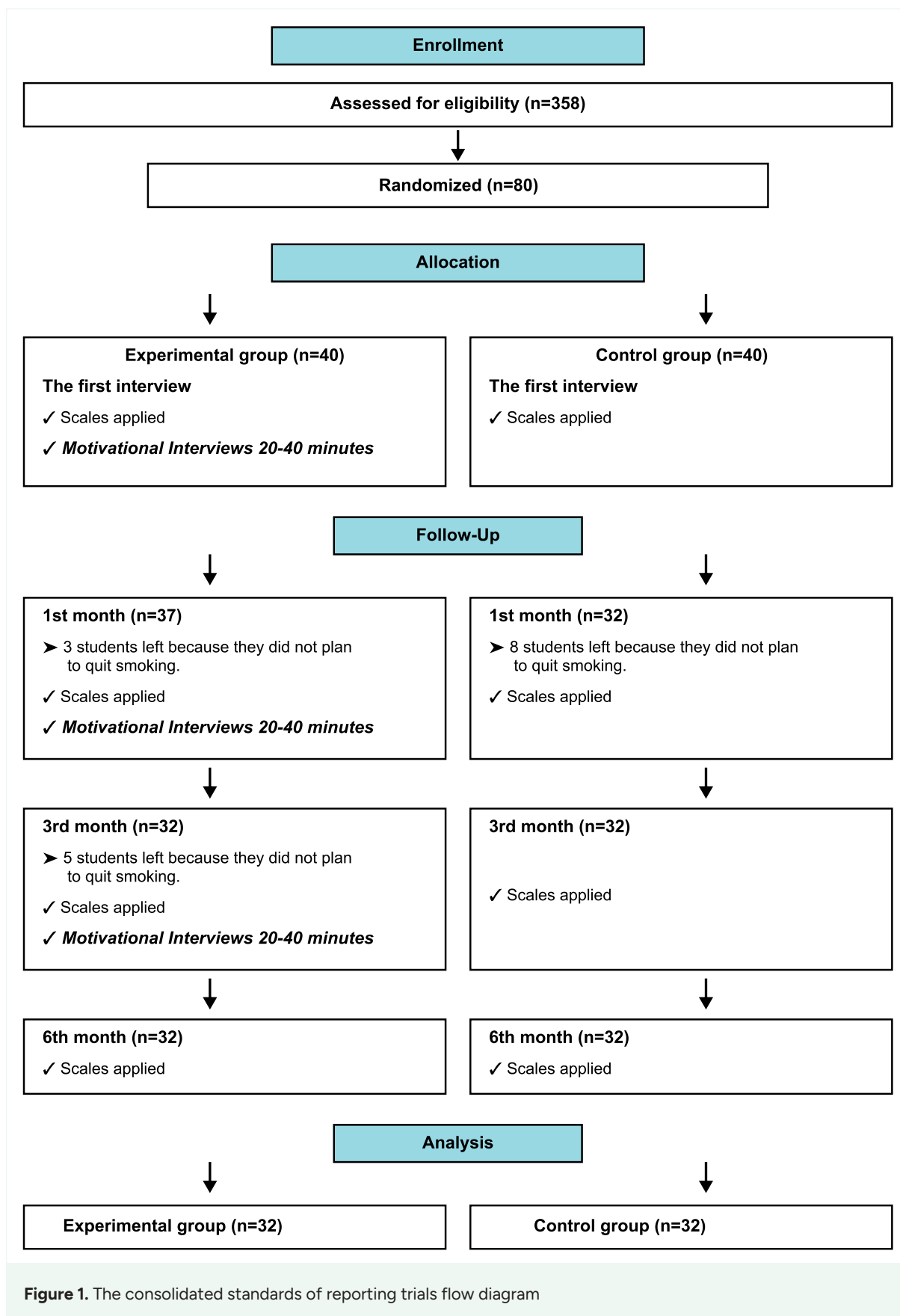


Figure 1. The consolidated standards of reporting trials flow diagram

In the intervention group, individual motivational interviews were scheduled at mutually convenient times between the researcher and the participants. The initial session was followed by hybrid (online and face-to-face) follow-up interviews at the first, third, and sixth months, during which relapse episodes and behavioral changes were evaluated using the Stages of Change Short Form. The timeline of the counseling program for the intervention group is shown in Table 1. No intervention or contact beyond routine assessments was provided to the control group.

Research data were collected from experimental and control groups using the Student Introduction Form, Beck Depression Inventory, the Fagerström Test for Nicotine Dependence, Sherer's General Self-Efficacy Scale, the decisional balance measure, Behavior Change Stage Diagnostic Short Question Form, and the Questionnaire of Smoking Urges.

After the interviews started, eight students in the experimental group and eight students in the control group left the study due to giving up on smoking cessation. The study was completed with 64 volunteers who met the participation criteria, 32 of them being in the experimental group and 32 in the control group (Figure 1).

Data Collection Forms

Student Introduction Form

The research team compiled a 17-question form using the relevant literature (Taş et al., 2016; Müssener et al., 2016; Terzi et al., 2019; and Hezer & Karalezli, 2019) to inquire about the student's sociodemographic characteristics such as age, gender, marital status, department, physiological and spiritual health, medicine use status, age of smoking initiation, smoking habits in the close circle of family and friends, amount of smoking, smoking cessation trial status, the last date of

smoking cessation, the longest period of smoking cessation, and previous support for smoking cessation.

Beck Depression Inventory

The BDI was developed by Beck et al. (1961) to assess the somatic, emotional, cognitive, and motivational symptoms of depression. The Turkish adaptation of the scale was conducted by Hisli (1989). The BDI is a self-report inventory consisting of 21 items. Each item is scored on a scale ranging from 0 to 3, yielding a total score that ranges between 0 and 63. Based on the total score, depression severity is classified as minimal depression (0–9 points), mild depression (10–16 points), moderate depression (17–29 points), and severe depression (30–63 points).

The Fagerström Test for Nicotine Dependence

Accurate determination of the individual's nicotine addiction level is an important factor in increasing the success of smoking cessation attempts. For this purpose, in the evaluation of smoking addiction, the Fagerström Test for Nicotine Dependence (FTND), created by Heatherton et al. (1991) examines the level of an individual's ability to stay smoke-free for a certain period and the number of cigarettes they smoke. The test consists of six questions, and the score for each question is given separately. According to the results of this test, nicotine addiction is minimal for scores 0–4, moderate for scores 5–6, and high for scores 7–10. In Türkiye, FTND was adapted to Turkish by Uysal et al. (2004), and its reliability and validity were established.

Sherer's General Self-Efficacy Scale

It is a scale created by Sherer et al. (1982), adapted to Turkish by Gözümlü and Aksayan (1999), and developed to evaluate

Table 1. Timeline of the intervention group counseling program

Interviews	Counseling and Duration	Consulting Initiative Components
The first interview	Individual online counseling/motivational interview: 20–40 min	Determination of smoking habit, individual interview in accordance with the change phase, smoking cessation counseling, and application of scales
First month	Individual online counseling/motivational interview: 20–40 min	Individual interview in accordance with the change phase, smoking cessation counseling, and application of scales
Third month	Individual hybrid (online and face-to-face) counseling/motivational interview: 20–40 min	Individual interview in accordance with the change phase, smoking cessation counseling, and application of scales
Sixth month	Individual face-to-face meeting: 20 min	Determination of smoking status, smoking cessation counseling, and application of scales

behavior and behavioral changes. In a 5-point Likert-type scale comprising 23 items, each item is marked as 1 - Does not define me at all, 2 - Defines me a little, 3 - I am indecisive, 4 - Defines me well, 5 - Defines me very well. The minimum score is 23, and the maximum score is 115. As the total score obtained from the scale increases, the individual's perception of self-efficacy also increases.

The Decisional Balance Measure for Assessing and Predicting Smoking Status

The Smoking Decisional Balance Scale explains the benefits and harms of changing problem behavior, in other words, the benefits of change and the obstacles to change. This scale also reveals the cognitive and motivational factors in decision-making. The scale, developed by Velicer et al. (1985), had its validity and reliability established by Plummer et al. (2001). The adaptation of the scale to Turkish society was made by Yalçinkaya-Alkar and Karanci (2007). The scale comprises 24 items, 12 items measuring the perceived positive aspects of smoking and 12 items measuring the perceived negative aspects of smoking. In the scale scored in the Likert style, the items are evaluated between 1 and 5 (1 - Completely disagree, 2 - Disagree, 3 - Indecisive, 4 - Agree, 5 - Completely agree). The lowest score was 12, and the highest score was 60 in the dimension of perceived benefits and perceived harms of smoking. The overall average score of the scale is obtained by subtracting the perceived benefits from the perceived harms of the smoking score. The fact that the overall average score of the scale has a negative value indicates that the perceived harms of smoking predominate, while the fact that it has a positive value indicates that the perceived benefits of smoking predominate.

Behavior Change Stage Diagnostic Short Question Form

The change questions developed by DiClemente et al. (1991) enable the identification of the stages of change that people who want to change their problematic behavior and strive for it go through. The change phase assessment questions are an algorithm that determines the stages of people thinking about quitting smoking and consists of five stages. The individuals participating in the study are asked to choose one of the options that match the behavior change stage levels for smoking cessation. The answer of an individual to the "Have you stopped smoking?" question determines the stage of change. These stages and their corresponding answers are:

- Pre-contemplation: "I'm not thinking of quitting in the next 6 months."
- Contemplation: "I'm thinking of quitting in 6 months."
- Preparation: "I'm thinking of quitting in 30 days."

- Action: "I quit less than 6 months ago."
- Maintenance: "I quit more than 6 months ago" (Velicer et al., 1998).

The Questionnaire of Smoking Urges

The validity and reliability study of the Questionnaire of Smoking Urges was conducted by Demirezen (2013). The scale is rated between 1 -- strongly disagree at all, 2 - disagree, 3 - partially disagree, 4 - indecisive, 5 - partially agree, 6 - agree, and 7 - strongly agree in the Likert-type and contains ten questions. The lowest score on the scale is 10, which indicates that there is no desire to smoke. The highest score is 70, which indicates a very high desire to smoke.

The Ethical Approval of the Research

Ethical committee approval was received from the Ethics Committee of İzmir Katip Çelebi University Non-Interventional Clinical Studies (Approval no: 1071; Date: November 19, 2020). For the scales used in the research, permissions were obtained from the scale owners. The purpose of the research was explained, and an online consent form and verbal permission were obtained from the students participating in the research. The Clinical Trial registration of the study was completed (NCT05324644).

Data Analysis

In data analysis, the team used the SPSS for Windows version 25.0 (IBM SPSS Corp.; Armonk, NY, USA). Mean $\pm$ standard deviation, median (maximum-minimum), percentage, and frequency values were used for the variables. The validity of the repeated measures of the data for analysis of variance was evaluated by Mauchly's sphericity test and the Box-M homogeneity test of variances. In order to compare the averages, a factorial repeated measures analysis of variance was used. One of the Greenhouse and Geisser (1959) or Huynh and Feldt (1976) tests was used to correct the degrees of freedom that did not meet the prerequisites of parametric tests (a factorial repeated measures analysis of variance). Multiple comparisons were performed with the Corrected Bonferroni Test (Edwards, 1993).

The normality of the variables and the homogeneity of the variances were evaluated after checking the prerequisites (Shapiro-Wilk and Levene Test). While performing data analysis, for the comparison of two groups, the Mann-Whitney *U* test was used, and for the comparison of three or more groups, ANOVA and repeated measures analysis of variance were used. Categorical data were analyzed by Fisher's exact test and chi-square test. In cases where the expected frequencies are less than 20%, the "Monte Carlo Simulation" method was used to evaluate the inclusion of these frequencies in the analysis. $p < .05$ and $p < .01$ were accepted for the significance level of the tests.

Results

Participant Characteristics

While comparing the distribution of students in the experimental and control groups according to their sociodemographic characteristics, it was determined that the groups were similar, and that there was no difference between their age, gender, department of studies, history of illness, or drug use status ($p > .05$).

The Smoking Status of Students

Students in the experimental and control groups were not different regarding their age of smoking initiation, average monthly expense for tobacco products, smoking habits in the close circle of family and friends, amount of smoking, usage of other addictive substances, smoking cessation trial status, and previous support for smoking cessation ($p > .05$).

Depression Status of the Students

At the beginning of the study, the mean BDI score of the students in the experimental group was found to be 11.21 ± 4.69 , while that of the control group was found to be 11.90 ± 4.69 . Both groups were in the mild depression category, and no statistically significant difference was found between the groups ($p > .05$).

The Distribution of Students' Behavior Change Stages According to Repeated Measurements

During the sixth month interview, it was detected that from the students of the experimental group who conducted motivational interviews, 46.9% ($n = 15$) of them were at the contemplation stage, 15.6% ($n = 5$) were at the preparation stage, and 37.5% ($n = 12$) were at the action stage, while from the students of the control group, 31.3% ($n = 10$) of them were at the pre-contemplation stage, 53.1% ($n = 17$) were at the contemplation stage, 6.3% ($n = 2$) were at the preparation stage, and 9.4% ($n = 3$) were at the action stage (Figure 2).

The Comparison of Students' Smoking Cessation Status According to Repeated Measurements

The smoking cessation rate of the students in the experimental group (37.5%; $n:12$) was four times higher than that of the control group (9.4%; $n:3$) during the sixth month (Figure 3). There was a significant difference in the comparison of the smoking cessation status of students in the experimental and control groups according to the follow-ups ($p < .05$) (Figure 3).

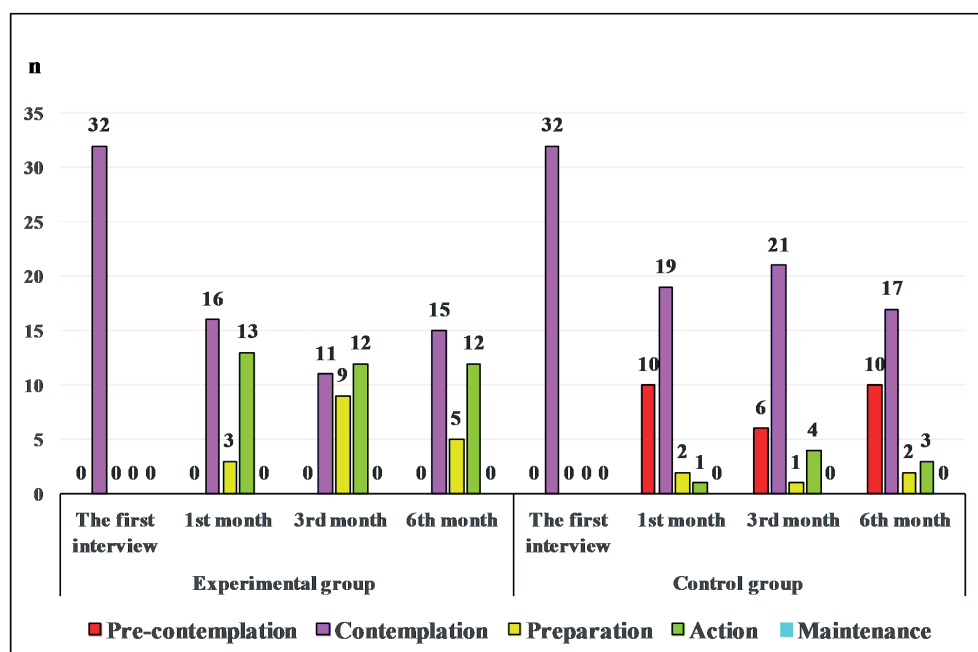


Figure 2. The distribution of students' behavior change stages according to repeated measurements

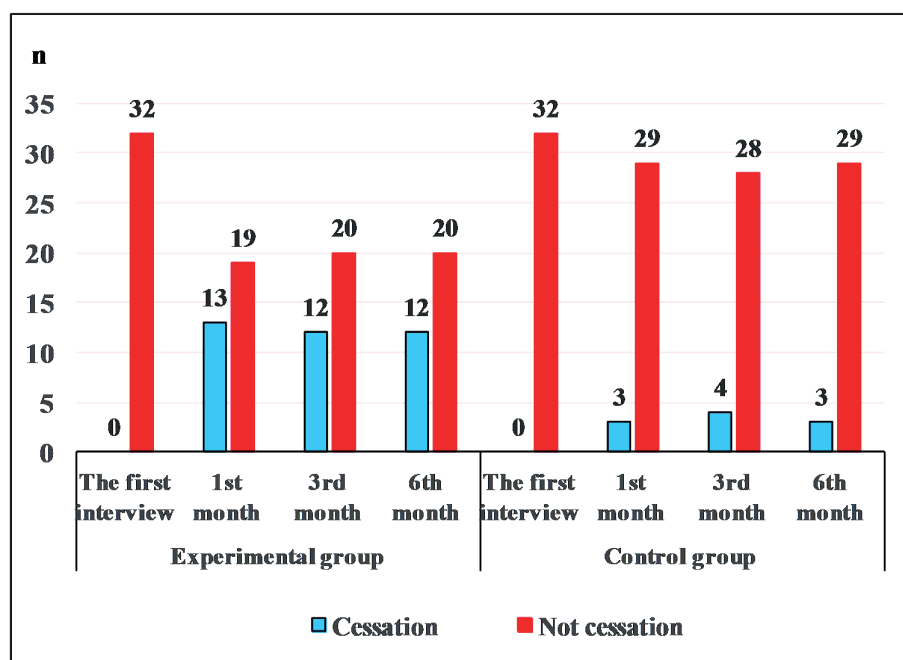


Figure 3. The comparison of students' smoking cessation status according to repeated measurements

The Comparison of the Fagerström Test for Nicotine Dependence, Sherer's General Self-Efficacy Scale, the Decisional Balance Measure for Assessing and Predicting Smoking Status, and the Questionnaire of Smoking Urges Score Averages of Students in Experimental and Control Groups According to Repeated Measurements

The comparison of FTND scores in repeated measurements between groups showed no significant difference in the first interview ($p = .440$) and the follow-ups of the first month ($p = .086$) and sixth month ($p = 0.252$), but detected a significant difference in the third month interview ($p < .05$). In the experimental group where MI was applied, the FTND values of the students who were at the intermediate level (5.15 ± 1.32) at the first interview decreased to a low level (3.50 ± 1.93) at the end of the third month. A significant difference was found in the comparison of the mean FTND scores of the students in the experimental and control groups according to the time-dependent follow-ups ($p < .001$) (Table 2).

There was no significant difference between the groups' SGSES total score averages ($p > .05$) {(first ($p = .142$), first month ($p = .946$), third month ($p = .190$), and sixth month (p

$= .630$) interviews}. According to the repeated measurements made on the students in the experimental and control groups, their SGSES scores decreased, and a significant time-related difference was found ($p < .05$) (Table 2).

While examining the students' decisional balance measure (DBM) scores, it was determined that the perceived harms of smoking were higher in the experimental group (-15.03 ± 11.06) than in the control group (-8.06 ± 11.06). While there was no significant difference in the DBM scores of the first ($p = .184$), first month ($p = .208$), and third month ($p = .056$) interviews ($p > .05$), a significant difference was found in the sixth-month interview ($p = .014$) ($p < .05$). There was no significant time-related difference in the repeated measurement of the experimental and control groups' DBM scores ($p > .05$) (Table 2).

While comparing the students' average scores of QSU, the experimental group's scores were lower in all interviews compared to the control group, and there was no significant difference between the first ($p = .438$), first month ($p = .530$), third month ($p = .084$), and sixth month ($p = .186$) interviews. There was no significant time-related difference in the average repeated measurement of QSU scores in the experimental and control groups ($p > .05$) (Table 2).

Table 2. The comparison of the score averages of students in experimental and control groups according to repeated measurements (n: 64)

Scales	Groups	Interviews				Test Statistic*	p
		The First Interview	First Month	Third Month	Sixth Month		
		$\bar{X} \pm ss$	$\bar{X} \pm ss$	$\bar{X} \pm ss$	$\bar{X} \pm ss$		
FTND	Experimental	5.15 $\pm$ 1.32	4.31 $\pm$ 2.35	3.50 $\pm$ 1.93	4.55 $\pm$ 2.16	19.687	<.001
	Control	5.43 $\pm$ 1.56	3.96 $\pm$ 2.71	4.39 $\pm$ 3.11	4.27 $\pm$ 3.21	7.055	<.001
	Test statistic **	0.603	3.036	5.519	1.338		
	p	.440	.086	.022	.252		
SGSES	Experimental	63.71 $\pm$ 7.80	64.46 $\pm$ 10.6	60.50 $\pm$ 11.3	60.59 $\pm$ 10.9	3.049	.035
	Control	60.46 $\pm$ 9.57	65.01 $\pm$ 12.0	64.28 $\pm$ 11.5	59.15 $\pm$ 12.7	2.768	.048
	Test statistic **	2.216	0.005	1.759	0.234		
	p	.142	.946	.190	.630		
DBM	Experimental	-11.18 $\pm$ 8.82	-11.75 $\pm$ 9.95	-11.62 $\pm$ 11.61	-15.03 $\pm$ 11.06	2.167	.101
	Control	-7.87 $\pm$ 10.78	-8.34 $\pm$ 11.42	-4.90 $\pm$ 15.66	-8.06 $\pm$ 11.06	1.654	.186
	Test statistic **	1.807	1.616	3.797	6.345		
	p	.184	.208	.056	.014		
QSU	Experimental	29.31 $\pm$ 17.36	29.93 $\pm$ 17.38	27.03 $\pm$ 14.45	25.65 $\pm$ 17.12	1.552	.210
	Control	32.59 $\pm$ 16.29	32.59 $\pm$ 16.20	34.15 $\pm$ 17.80	31.43 $\pm$ 17.46	0.421	.738
	Test statistic **	0.611	0.400	3.089	1.788		
	p	.438	.530	.084	.186		

The p-values in bold represent statistical difference.

Note: DBM = Decisional balance measure; FTND = Fagerström test for nicotine dependence; n = Number; QSU = Questionnaire of Smoking Urges; SGSES = Sherer's General Self-Efficacy Scale; ss = Standard deviation; $\bar{X}$ = Mean.

*Time-dependent repeated analysis of variance test.

**Group-dependent repeated analysis of variance test.

Discussion

In the research, the effect of MI on students' decisions toward smoking cessation was examined. Changes in smoking cessation rates and behavioral stages in the study showed that MI is effective in quitting smoking, and the results are consistent with other studies (Taş et al., 2016; Müssener et al., 2016; Terzi et al., 2019; Arslanoğlu et al., 2020; Merih et al., 2021; Brar et al., 2020; Deressa Guracho et al., 2020; Gill et al., 2022; Nasser et al., 2020; Xiong et al., 2020; Zeng et al., 2020; Sayed et al., 2023; Dereli et al., 2023).

The cessation rate of the experimental group (37.6%) who underwent MI was found to be four times higher than that of the control group (9.4%). The cessation rates of the studies with MI application vary in a broad range (14% in Pardavila-Belio et al., 2019; 16.5% in Gill et al., 2022; 20.6% in Müssener et al., 2016; 21.1% in Pardavila-Belio et al., 2015; 33.3% in Erol and Erdoğan, 2008; 37% in Güngörmüş and Erci, 2012; 46.1% in Taş, 2015; 69.1% in Karadağ et al., 2011; 80.5% in Sayed et al., 2023). This wide range is thought to be due to the application of text messages, training, and applications that support quitting similar to MI in other studies. This study has only determined the effectiveness of MI, and similar further studies will be useful in determining the effectiveness of MI more clearly.

At the end of the sixth month, 17 participants in the experimental group were in the preparation and action stages, indicating progress in the behavior change stages, while 10 participants in the control group with no MI application

returned to the pre-contemplation stage. This situation shows that MI affects the behavior change stages of students' smoking cessation decisions and that there are advances from the contemplation stage to the action stage. Similar findings have been highlighted in other studies (Durmaz et al., 2019; Gill et al., 2022; Taş et al., 2016; Terzi et al., 2019; Pardavila-Belio et al., 2019; Sayed et al., 2023). Lindson-Hawley et al. (2015), in their meta-analysis studies, found that MI by primary care physicians, nurses, or counselors, in the procedure of one to six sessions, with a session duration varying from 10 to 60 minutes, is effective in behavior change. Dereli et al. (2023), in a meta-analysis, reported that MI is effective in promoting smoking cessation among university students.

In the study, the initial FTND medium and low scores decreased as the students' stages of change progressed, and there have been similar results in many other studies conducted on the young population (Brar et al., 2020; Deressa Guracho et al., 2020; Kim et al., 2018; Nasser et al., 2020; Xiong et al., 2020; Zeng et al., 2020; Arslanoğlu et al., 2020; Durmaz et al., 2019; Merih et al., 2021; Sözer et al., 2021; Terzi et al., 2019). The FTND score is an effective indicator of behavior change and cessation rate in cessation attempts (Pardavila-Belio et al., 2019; Hezer & Karalezli, 2019; Gill et al., 2022). For this reason, the relevant university units should determine and record the students' smoking status and conduct short MI for smoking cessation.

The smoking cessation rates of the experimental group at the end of the sixth month were higher than those of the control group. However, contrary to expectations, there

was a decrease in the SGSES scores of the students in the experimental group, showing no significant difference between the experimental and control groups.

Individuals demonstrating higher levels of self-efficacy are more likely to continue progressing through the action and maintenance stages. This is attributable to the fact that self-efficacy has been reported to be associated with behavioral change. This underscores the pivotal function of self-efficacy in maintaining long-term behavioral modifications (Karl, 2020; Pardavila-Belio et al., 2019). The observed variations in self-efficacy scale scores can be ascribed to the unique conditions engendered by the pandemic. The pandemic may have exerted its influence on levels of self-efficacy through a variety of mechanisms. It is hypothesised that restrictions on social interaction, limited access to support systems, disruptions in daily routines, and increased psychological stress may have undermined individuals' confidence in initiating or sustaining behavioral changes. Conversely, for some individuals, heightened health concerns during the pandemic may have functioned as a catalyst for motivation, thereby reinforcing commitment to change and augmenting self-efficacy.

The decline in DBM scores observed in the experimental group following the implementation of an MI intervention suggests an enhancement in awareness regarding the adverse consequences associated with smoking. Furthermore, the finding that the experimental group's DBM scores were significantly lower than those of the control group ($p < .05$) suggests that MI may have effectively changed participants' cognitive assessments of the costs and benefits of smoking. This shift in decision balance is indicative of an increased awareness of the health risks and social consequences of smoking, thereby facilitating progress toward behavioral change.

These findings are consistent with previous research showing that increasing awareness of both the benefits and harms of problematic behaviors strengthens individuals' motivation to change (Yararbaş et al., 2019). Within the framework of MI, decision balance plays an important role by creating ambivalence in the individual. Indecision constitutes a fundamental element targeted therapeutically in MI, helping individuals resolve internal conflicts and progress through the stages of change. As indecision decreases and the negative aspects of smoking become more apparent, individuals are more likely to progress from the contemplation stage to the preparation stage and ultimately to the action and maintenance stages.

Consequently, evaluating individuals' perceptions of the advantages and disadvantages of smoking can serve not only as a diagnostic instrument but also as an effective component in the tailoring of MI sessions to the individual. This approach has the potential to facilitate the development of more targeted interventions, enhanced participant involvement in the process, and ultimately, the promotion of enduring

behavioral change in smoking cessation programmes for university students.

Research has identified the craving or urge to smoke as an important predictor of both relapse (re-starting) and difficulties in maintaining smoking cessation (Müssener et al., 2016; Demirezen & Kurçer, 2017; Hezer & Karalezli, 2019). It is therefore evident that the recognition and effective management of cravings is considered a critical component of smoking cessation interventions. It has been demonstrated by preceding studies that MI has the capacity to contribute to a reduction in craving levels by means of an increase in individuals' intrinsic motivation, the development of their coping skills, and the addressing of their ambivalence toward smoking.

In this study, although the decrease in Cigarette Craving Scale (QSU) scores was not statistically significant ($p > .05$), a consistent downward trend was observed over time; lower craving scores were recorded in the experimental group compared to the control group at each measurement point. This pattern suggests that MI may have a gradual effect on craving levels, which may have been achieved by strengthening participants' cognitive control, improving their emotional regulation, and increasing their awareness of internal triggers. The absence of statistical significance may be ascribed to a number of factors, including the comparatively brief follow-up period, the limited sample size, or individual variations in withdrawal symptoms.

It is widely acknowledged that craving represents a significant challenge for individuals attempting to quit smoking, often resulting in relapse during the early stages of the process, as well as during the maintenance phase. In this context, the integration of MI into nursing practices in counseling units may offer an effective approach to coping with withdrawal-related distress. MI employs client-centred and non-confrontational techniques to assist individuals in identifying coping strategies, anticipating high-risk situations, and developing personalised plans for managing urges. This approach is designed to support sustained cessation.

While secondary variables such as self-efficacy, decisional balance, and craving were measured and reported, this study was not designed to examine their mediating roles. Future research with larger sample sizes and structural modeling approaches is recommended to explore how these psychological constructs influence or mediate the process of smoking cessation.

The findings of this study underscore the potential value of incorporating MI into comprehensive smoking cessation programs delivered by nurses, who are often the first point of contact in health care settings and are well-positioned to provide ongoing behavioral support. Future studies employing larger sample sizes and longer follow-up periods may better capture the cumulative effects of MI on craving reduction and long-term abstinence outcomes.

Limitations and Directions/Suggestions for Future Research

The study only conducted analyses on participants who completed the intervention process, and no intention-to-treat (ITT) analysis was performed. This reduces the representativeness of the sample and limits the generalizability of the findings because the effects of individuals who dropped out of the study were not taken into account. In future studies, it is recommended that the ITT approach and appropriate missing data completion methods (e.g., multiple imputation) be used to reduce the effect of missing data. Data on smoking cessation status are based on participants' self-reports, and objective biochemical verification methods (e.g., cotinine or carbon monoxide measurements) were not used. This may lead to a risk of reporting bias, so caution should be exercised in interpreting the results.

A notable limitation of this study is its open label design, as participants were aware of whether they were receiving online or face-to-face training. This awareness may have introduced expectation bias, performance bias, and social desirability effects.

This study shows that TTM-based MI is effective in students' smoking cessation decisions and provides progress in the behavior change phase during the smoking cessation process. The strength of the study is that motivational interviews were only conducted for students during the cessation process, eliminating other influences. It is recommended to ensure that students choose their colours to create awareness in all accessible areas, and apply MI using a nurse in smoking cessation therapies. Conducting motivational interviews with a nurse about quitting smoking provides a unique opportunity for students to support their decision to quit smoking. It is proposed to establish units in universities where students who want to quit smoking can apply, receive counseling, and expand the use of MI.

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Author contributions

Conception and design: F.D., B.Y.; Data acquisition: F.D.; Data analysis: F.D.; Data interpretation: F.D., B.Y.; Drafting of the manuscript: F.D., B.Y.; Critical revision of the manuscript: F.D., B.Y. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Izmir Katip Celebi University Non-Interventional Clinical Studies Ethical Committee (Date:

November 19, 2020, Decision/Protocol No: 1071). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Arslanoğlu, C., Acar, K., Arslanoğlu, E., Baynaz, K., Karakaş, F., İpekoğlu, G., & Mor, A. (2020). Investigation of smoking habits and quality of life of university students (sample of Sinop university). *Ekev Akademi Dergisi*, 24(84), 195-210. [\[Crossref\]](#)
- Asma, S., Mackay, J., Song, S. Y., Zhao, L., Morton, J., & Palipudi, K. M. (2015). *The GATS Atlas: Global Adult Tobacco Survey*. CDC Foundation. Centers for Disease Control and Prevention; World Lung Foundation; Global Tobacco Surveillance System; World Health Organization.
- Beck, A. T., Ward, C. H., Mendelson, M., Mock, J., & Erbaugh, J. (1961). An inventory for measuring depression. *Archives of General Psychiatry*, 4(6), 561-571. [\[Crossref\]](#)
- Brar, M., Chaudhary, N., Ramakrishnan, T. S., & Randhawa, A. (2020). A study of prevalence of tobacco use and related factors among medical students as per the Global Health Professions Student Survey protocol. *International Journal of Research in Medical Sciences*, 8(6), 2243-2247. [\[Crossref\]](#)
- Demirezen, M. (2013). *Sigara içme arzusu ölçeği'nin Türkçe geçerlilik, güvenirliği ve anksiyete ile ilişkisi* (Thesis No. 340747) [Medical specialization thesis, Bülent Ecevit University]. Council of Higher Education National Thesis Center.
- Demirezen, M., & Kurçer, M. A. (2017). Effect of smoking cessation on anxiety and urge for smoking. *Journal of Dependence*, 18(2), 53-58.
- Dereli, F., Tekindal, M., & Agah Tekindal, M. A. (2023). The effect of motivational interviewing on smoking cessation of university students: A meta-analysis. *ADDICTA: The Turkish Journal on Addictions*, 10(3), 275-281. [\[Crossref\]](#)

- Deressa Guracho, Y., Addis, G. S., Tafere, S. M., Hurisa, K., Bifftu, B. B., Goedert, M. H., & Gelaw, Y. M. (2020). Prevalence and factors associated with current cigarette smoking among Ethiopian university students: A systematic review and meta-analysis. *Journal of Addiction*, 2020, 9483164. [Crossref]
- Diclemente, C. C., Prochaska, J. O., Fairhurst, S., Velicer, W. F., Rossi, J. S., & Velasquez, M. (1991). The process of smoking cessation: An analysis of precontemplation, contemplation and contemplation/action. *Journal of Consulting and Clinical Psychology*, 59(2), 295-304. [Crossref]
- Durmaz, S., Ergin, I., Durusoy, R., Hassoy, H., Caliskan, A., & Okyay, P. (2019). WhatsApp embedded in routine service delivery for smoking cessation: Effects on abstinence rates in a randomized controlled study. *BMC Public Health*, 19(1), 387. [Crossref]
- Edwards, L. K. (1993). *Applied analysis of variance in the behavioral sciences*. Marcel Dekker, Inc.
- Erol, S., & Erdoğan, S. (2008). Application of a stage based motivational interviewing approach to adolescent smoking cessation: The transtheoretical Model-based study. *Patient Education and Counseling*, 72(1), 42-48. [Crossref]
- Gill, V. S., Chaudhary, N., Randhawa, A., Verma, M., Rai, G. K., & Mishra, S. (2022). A prospective study to assess the outcome of motivational interviewing among male students of Haryana, India: A strive towards smoking cessation in the youth. *Cureus*, 14(2), e22642. [Crossref]
- Gözüm, S., & Aksayan, S. (1999). The reliability and validity of Turkish form of the self-efficacy scale. *Journal of Anatolia Nursing and Health Sciences*, 2(1), 21-34.
- Greenhouse, S. W., & Geisser, S. (1959). On methods in the analysis of profile data. *Psychometrika*, 24(2), 95-112. [Crossref]
- Güngörmüş, Z., & Erci, B. (2012). Transtheoretical Model -Based education given for smoking cessation in higher school students. *Southeast Asian Journal of Tropical Medicine and Public Health*, 43(6), 1548-1559.
- He, L., Basar, E., Wiers, R. W., Antheunis, M. L., & Krahmer, E. (2022). Can chatbots help to motivate smoking cessation? A study on the effectiveness of motivational interviewing on engagement and therapeutic alliance. *BMC Public Health*, 22(1), 726. [Crossref]
- Heatherton, T. F., Kozlowski, L. T., Frecker, R. C., & Fagerström, K. O. (1991). The Fagerström Test for Nicotine Dependence: A revision of the Fagerstrom Tolerance Questionnaire. *British Journal of Addiction*, 86(9), 1119-1127. [Crossref]
- Hezer, H., & Karalezli, A. (2019). The effect of psychological dependence on smoking urge and nicotine withdrawal symptoms. *Ankara Medical Journal*, 19(4), 700-707. [Crossref]
- Hisli, N. (1989). Beck depresyon envanterinin üniversite öğrencileri için geçerliği, güvenirliği. *Psikoloji Dergisi*, 7(23), 3-13.
- Hsu, C. Y., Liao, H. E., & Huang, L. C. (2020). Exploring smoking cessation behaviors of outpatients in outpatient clinics: Application of the transtheoretical model. *Medicine*, 99(27), e20971. [Crossref]
- Huynh, H., & Feldt, L. S. (1976). Estimation of the box correction for degrees of freedom from sample data in randomized block and split-plot designs. *Journal of Educational Statistics*, 1(1), 69-82. [Crossref]
- Karadağ, M., Karadağ, S., Ediz, S., & Işık, E. S. (2011). The effect of nicotine dependence on smoking cessation. *New Journal of Medicine*, 29(1), 27-31.
- Karl, T. (2020). *The 5 stages of change and the Transtheoretical Model (TTM) — Do i know the basics?*. <https://r1learning.com/blog/2020/5-stages-of-change>
- Kim, B., Yoo, S., & Cho, S. I. (2018). Association between stages of change for smoking cessation and electronic cigarette use among adult smokers: A nationwide cross-sectional study in Korea. *PLoS One*, 13(9), e0204244. [Crossref]
- Kumar, R., Sahu, M., & Rodney, T. (2022). Efficacy of motivational interviewing and brief interventions on tobacco use among healthy adults: A systematic review of randomized controlled trials. *Investigacion y Educacion en Enfermeria*, 40(3), e03. [Crossref]
- Lindson, N., Thompson, T. P., Ferrey, A., Lambert, J. D., & Aveyard, P. (2019). Motivational interviewing for smoking cessation. *Cochrane Database of Systematic Reviews*, 7(7), CD00693. [Crossref]
- Lindson-Hawley, N., Thompson, T. P., & Begh, R. (2015). Motivational interviewing for smoking cessation. *Cochrane Database of Systematic Reviews*, 3(3), CD006936. [Crossref]
- Merih, Y. D., Güdük, Ö., Ertürk, N., Yemenci, M., Arça, K. Y., & Satman, İ. (2021). Determinants of tobacco use habits and perceptions among university students: A systematic review study. *Journal of Health Institutes of Türkiye*, 4(1), 49-84.
- Müssener, U., Bendtsen, M., Karlsson, N., White, I. R., McCambridge, J., & Bendtsen, P. (2016). Effectiveness of short message service text-based smoking cessation intervention among university students: A randomized clinical trial. *JAMA Internal Medicine*, 176(3), 321-328. [Crossref]
- Nasser, A. M., Geng, Y., & Al-Wesabi, S. A. (2020). The prevalence of smoking (cigarette and waterpipe) among university students in some Arab countries: A systematic review. *Asian Pacific Journal of Cancer Prevention: APJCP*, 21(3), 583-591. [Crossref]
- O'Leary, R., & Polosa, R. (2020). Tobacco harm reduction in the 21st Century. *Drugs and Alcohol Today*, 20(3), 219-234. [Crossref]
- Ögel, K., & Şimşek, M. (2021). *Motivasyonel görüşme tekniği*. İş Bankası Kültür Yayınları.
- Pardavila-Belio, M. I., García-Vivar, C., Pimenta, A. M., Canga-Armayor, A., Pueyo-Garrigues, S., & Canga-Armayor, N. (2015). Intervention study for smoking cessation in Spanish college students: Pragmatic randomized controlled trial. *Addiction (Abingdon, England)*, 110(10), 1676-1683. [Crossref]
- Pardavila-Belio, M. I., Ruiz-Canela, M., & Canga-Armayor, N. (2019). Predictors of smoking cessation among college students in a pragmatic randomized controlled trial. *Prevention Science*, 20(5), 765-775. [Crossref]
- Plummer, B. A., Velicer, W. F., Redding, C. A., Prochaska, J. O., Rossi, J. S., Pallonen, U. E., & Meier, K. S. (2001). Stage of change, decisional balance, and temptations for smoking measurement and validation in a large, school-based population of adolescent. *Addictive Behaviors*, 26(4), 551-571. [Crossref]
- Prochaska, J. O., & Norcross, J. C. (2018). *Systems of psychotherapy: A transtheoretical analysis*. Oxford University Press.
- Sayed, S. H., El-Sakkar, S. M., Ahmed Elsaka, S. A., & El-Houfey, A. A. (2023). Effect of cigarette smoking cessation educational intervention based on trans-theoretical model using motivational interviewing on Egyptian males' smoking knowledge and behavior: A randomized controlled trial. *Nursing Practice Today*, 10(2), 108-123. [Crossref]
- Xiong, P. S., Xiong, M. J., Liu, Z. X., & Liu, Y. (2020). Prevalence of smoking among adolescents in China: An updated systematic review and meta-analysis. *Public Health*, 182, 26-31. [Crossref]
- Sherer, M., Maddux, J. E., Mercandante, B., Prentice-Dunn, S., Jacobs, B., & Rogers, R. W. (1982). The self-efficacy scale: Construction and validation. *Psychological Reports*, 51(2), 663-671. [Crossref]

- Sözer, Ü., Özvurmaz, S., & Durmaz, S. (2021). Readiness of healthcare workers to receive support for smoking cessation and related factors. *Turkish Journal of Family Medicine and Primary Care*, 15(2), 286-293. [\[Crossref\]](#)
- Taş, F. (2015). *Lise öğrencilerinde ağızotunu (Dumansız tütün) bıraktırmaya yönelik transteoretik model temelli motivasyonel görüşmelerin etkisi* (Thesis No. 408430) [Doctoral dissertation, Erciyes University]. Council of Higher Education National Thesis Center.
- Taş, F., Seviğ, E. Ü., & Güngörmüş, Z. (2016). Use of motivational interview technique with transteoretical model for behavioral change in smoking addiction. *Current Approaches in Psychiatry*, 8(4), 380-392. [\[Crossref\]](#)
- Terzi, H., Kitiş, Y., & Akin, B. (2023). Effectiveness of non-pharmacological community-based nursing interventions for smoking cessation in adults: A systematic review. *Public Health Nursing*, 40(1), 195-207. [\[Crossref\]](#)
- Terzi, O., Kumcagiz, H., Terzi, M., & Dundar, C. (2019). Cigarette smoking and determination of nicotine dependence levels in university students. *ADDICTA: The Turkish Journal on Addictions*, 6(4), 168-181. [\[Crossref\]](#)
- Turkish Statistical Institute. (2020). *Global adult tobacco survey*. <https://data.tuik.gov.tr/Bulten/Index?p=Turkiye-Saglik-Arastirmasi-2019>
- Uysal, M. A., Kadakal, F., Karşıdağ, C., Bayram, N. G., Uysal, O., & Yılmaz, V. (2004). Fagerström test for nicotine dependence: Reliability in a Turkish sample and factor analysis. *Tüberküloz ve Toraks*, 52(2), 115-121.
- Velicer, W. F., DiClemente, C. C., Prochaska, J. O., & Brandenburg, N. (1985). Decisional balance measure for assessing and predicting smoking status. *Journal of Personality and Social Psychology*, 48(5), 1279-1289. [\[Crossref\]](#)
- Velicer, W. F., Prochaska, J. O., Fava, J. L., Norman, G. J., & Redding, C. A. (1998). Smoking cessation and stress management: Applications of the transteoretical model. *Homeostasis*, 38(5-6), 216-233.
- Yalçinkaya-Alkar, O., & Karanci, A. N. (2007). What are the differences in decisional balance and self-efficacy between Turkish smokers in different stages of change?. *Addictive Behaviors*, 32(4), 836-849. [\[Crossref\]](#)
- Yararbaş, G., Keles, D. O., Altuner, O. G., Turgut, C. B., Yılmaz, C., & Yuksel, K. (2019). Determination and evaluation of smoking status of individuals under probation. *Addicta: The Turkish Journal on Addictions*, 6(4), 215-244. [\[Crossref\]](#)
- Zeng, L. N., Zong, Q. Q., Zhang, J. W., An, F. R., Xiang, Y. F., Ng, C. H., Ungvari, G. S., Yang, F. Y., Yan, H., Chen, L. G., Hu, X., & Xiang, Y. T. (2020). Prevalence of smoking in nursing students worldwide: A meta-analysis of observational studies. *Nurse Education Today*, 84, 104205. [\[Crossref\]](#)

The association of opium addiction with prostate volume: A cross-sectional study

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Abstract

Benign prostatic hyperplasia is a condition in which the prostate gland enlarges in a non-cancerous manner. Opioids can decrease prostate-specific antigen levels along with testosterone and can lead to changes in prostate volume. The main objective of the present study was to determine whether there is an association between opioid addiction and prostate volume. This observational cross-sectional study included 174 male patients admitted to Loghman Hakim Hospital in Tehran, Iran, between December 2023 and November 2024. Participants were categorized into 2 groups: opioid users (exposed group; N = 87) and non-users (non-exposed group; N = 87). Prostate volume was measured using ultrasound, and statistical analyses involved independent samples t-tests, Mann-Whitney U tests, and Spearman's correlation coefficient. A p-value of less than .05 was considered statistically significant. Among opioid users, 71.3% primarily consumed opium, while the remaining individuals used methadone, refined opium, or heroin. The average prostate volume for all participants was 29.5 cm³, with no significant difference observed between opioid users and non-users (p = .268). However, a significant positive correlation was found between the duration of opioid use and prostate volume (Spearman's rho = 0.353, p < .001). Additionally, age showed a strong correlation with prostate volume in both opioid users (Spearman's rho = 0.476, p < .001) and non-users (Spearman's rho = 0.591, p < .001). This study found no significant association between prostate volume and opium addiction, smoking, body mass index, and past medical history. Age and duration of opium consumption were the only significant factors associated with prostate volume. To achieve definitive results, prospective studies with larger sample sizes are needed.

Keywords: opioid-related disorders, opium, prostate, prostatic hyperplasia

Main points

- There was no statistically significant relationship between opioid dependency and prostate volume within this research.
- Age showed a positive and significant association with prostate volume among both opioid users and non-users.
- The extent of opioid usage was seen to be significantly and positively correlated with prostate size among opioid users but may be related to the user's age.
- Smoking status and body mass index factors failed to show any significant association with prostate volume within the population under study.

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Introduction

Benign prostatic hyperplasia, or benign prostatic hyperplasia (BPH), causes the prostate gland to enlarge in a non-cancerous manner. This enlargement occurs due to the uncontrolled growth of the epithelial and fibromuscular tissues in the transition zone and periurethral area (Devlin et al., 2021). It is the most common disease in older men (Pascual Mathey, 2022). The prevalence of BPH increases with age, so it is 8-10% in men over 40 years and 90% in men over 90 years (Pascual Mathey, 2022). According to the latest studies in 2019, globally, 94 million men aged 40 years and older are affected by BPH, with an age-standardized prevalence of 2480 per 100,000 (Awedew et al., 2022). The highest prevalence of BPH in the Middle East is reported to be 23.8%, and it is related to Egypt, Saudi Arabia, Kuwait, and the UAE (Noweir et al., 2022). Enlargement of the prostate due to BPH results in the manifestation of obstructive and irritative lower urinary tract symptoms (Joseph et al., 2002). Benign prostatic hyperplasia can also increase prostate cancer occurrence, probably due to common underlying pathophysiological factors (Miah & Catto, 2014).

Prostate-specific antigen (PSA) is a glycoprotein that plays a role in seminal fluid liquefaction (Wang et al., 2017). Some conditions can increase PSA levels, such as elderly age, African American race, low body mass index (BMI), larger prostate size, infection, inflammation, trauma, prostate-related medical procedures, and prostate cancer (Press et al., 2020). Other factors can also decrease PSA levels, such as non-steroidal anti-inflammatory drugs, thiazides, statins, less mental stress, lycopene and vitamin C-containing foods, soy bread, and sufficient physical activity (Chang et al., 2010; Hackshaw-McGeagh et al., 2016; Salleh, 2008). Opioids are another factor that can decrease PSA levels along with testosterone (Hosseini et al., 2012). However, PSA levels and prostate volume have a positive correlation (Deori et al., 2017; Kusuma Duarsa et al., 2021; Udoh et al., 2020). The mechanism by which opioids reduce PSA is not fully understood, but several mechanisms have been suggested, including suppression of the hypothalamic-pituitary-gonadal axis, reducing prostate gland activity, and indirect anti-inflammatory effects of opioids (Lec et al., 2020; Rubinstein et al., 2013; Smith & Elliott, 2012). Therefore, in the present study, the aim is to evaluate whether opioid consumption can change prostate volume or not.

Although previous studies have mentioned the reducing effect of opioids on PSA (Hosseini et al., 2012), some of the other studies showed that PSA levels and prostate volume have a direct correlation (Aigbe et al., 2022; Putra et al., 2016). The number of studies investigating the correlation between opioid consumption and prostate volume is few. These study gaps, along with the small number of studies about the effect of opioids on prostate size, prompted to design this study to investigate the impact of opium and its derivatives on prostate volume.

Material and Methods

Patients' Selection

This observational cross-sectional study was conducted on all patients admitted to the Loghman Hakim Hospital in Tehran, Iran, from December 2023 to November 2024. It should be noted that written informed consent was obtained from all patients before the study. The exposed group contained the opioid-addicted patients who were admitted for non-prostatic problems, and the non-exposed group samples were selected among non-opioid-addicted patients who were referred for non-prostate causes. Each group contained 87 patients, and both were matched in age. The samples were chosen non-randomly by the census method from all the people referred to Loghman Hakim Hospital in December 2023-November 2024. The inclusion criteria were as follows: male patients 30-70 years old, patients with a history of addiction to opium or its derivatives for at least 1 year (for the exposed group), and those who lack addiction to other substances such as sedatives and alcohol. The exclusion criteria were as follows: presence of known prostate cancer or other malignancy, presence of urinary symptoms, abnormal findings in digital rectal examination, history of previous prostate surgery, history of pelvic radiotherapy, presence of bladder stones or urinary tract infection, prostate manipulation within the past 6 months, participants who do not provide informed consent for participation in the study, inability to speak or understand the language in which the study materials or interviews are conducted, and excluding participants who may provide incomplete or unreliable responses due to known dishonesty or difficulty understanding the research context.

Sample Size

The sample size was calculated for a cross-sectional study comparing the prevalence of the outcome between 2 independent groups: exposed and non-exposed. Based on prior data (Abolhasani Foroughi et al., 2023), a prevalence of 50% was assumed in the exposed group and 30% in the non-exposed group. The required sample size was estimated using the formula for comparing 2 proportions with pooled variance:

$$n = \frac{\left[Z_{1-\frac{\alpha}{2}} \cdot \sqrt{2\bar{p}(1-\bar{p})} + Z_{1-\beta} \cdot \sqrt{p_1(1-p_1) + p_2(1-p_2)} \right]^2}{(p_1 - p_2)^2}$$

Where $p_1 = 0.5$, $p_2 = 0.3$, and $\bar{p} = 0.4$. Using a 2-sided significance level of 0.05 ($Z_{1-\alpha/2} = 1.96$) and a statistical power of approximately 77% ($Z_{1-\beta} \approx 0.747$), the estimated minimum required sample size was 87 participants per group. This calculation ensures sufficient power to detect a 20-percentage point difference in prevalence between the 2 groups.

Data Collection

Prostate volume measurement was done for both exposed and non-exposed groups using transabdominal ultrasound by radiologists following standard protocols. The prostate volume was estimated using the oblate spheroid (Littrup et al., 1991; Toi, 2024), measuring each diameter in centimeters: width $\times$ anteroposterior plane $\times$ length $\times$ 0.5. The bladder of all patients was approximately at 50% capacity.

Demographic information and clinical data, including medical history, history of opium addiction, presence of underlying diseases, history of smoking and tobacco addiction, and any related clinical variables, are collected from the interview with the patient.

Statistical Analysis

We conducted statistical analyses with a primary focus on prostate volume as the outcome variable. To compare the demographic and clinical characteristics of opioid users and non-users, descriptive statistics was utilized. For group comparisons, independent samples *t*-test were applied for variables that followed a normal distribution, while the Mann-Whitney *U*-test was used for those that did not. To examine correlations between prostate volume and continuous variables such as age, BMI, and opioid use duration, Spearman's rank correlation coefficient was employed. Statistical significance was defined as a *p*-value of less than .05. All analyses were carried out using SPSS version 28.

The research obtained approval from the Research Ethics Committee of the School of Medicine, Shahid Beheshti University of Medical Sciences, Tehran, Iran, under the Approval ID IR.SBMU.MSP.REC.1402.431 on November 28, 2023.

Results

Patients Characteristics

This study analyzed 174 male patients who met the criteria for participation. Of the 174 participants who completed the study, 87 belonged to the opium consumer group (exposed group), and the other 87 belonged to the no opium group (non-exposed group). Within the exposed group, 71.3% used opium ($n = 62$), while others used methadone (9.2%, $n = 8$), refined opium or opium sap (14.9%, $n = 13$), or heroin (4.6%, $n = 4$). Refined opium, also known as opium sap, is the processed form of opium that is produced by simmering opium dross, either alone or in combination with raw opium, in water for an extended period.

Among the non-exposed group, 59.8% ($n = 52$) did not report any previous medical history or underlying disease, while 8.04% ($n = 7$) reported diabetes mellitus (DM), 9.2% ($n = 8$) reported hypertension (HTN), and 3.4% ($n = 3$) reported both HTN and DM. The remaining 19.5% ($n = 17$) reported other medical problems. In the exposed group, 72.4% ($n = 63$) did

not have any previous medical history, while 2.3% ($n = 2$) had DM, 12.6% ($n = 11$), and 2.3% ($n = 2$) had both HTN and DM. Moreover, 10.3% ($n = 9$) of the people had other medical problems. In the opium user group, the mean duration of opioid use was 18.37 years (standard deviation = 11.59).

In this study, out of 174 participants, 58.62% ($n = 102$) reported smoking cigarettes. Among the exposed group, 14.9% ($n = 13$) consumed opium or its derivatives orally, while 3.4% ($n = 3$) used the injection method. Additionally, 48.3% ($n = 42$) smoked the product to use opium or its derivatives, and 33.3% ($n = 29$) used opium or its derivatives in various ways. According to the study, the majority of participants, specifically 76.44% ($n = 133$), did not utilize any therapeutic drugs during the study (Table 1).

Prostate-Related Characteristics

In this study, the prostate volume was measured and found to range from 15 cm³ to 85 cm³. The mean prostate volume was 30.49 cm³ for all participants, with the non-exposed group having a mean prostate volume of 29.9 cm³. The opium consumer group had a lower mean prostate volume (29.2 cm³ vs 29.9 cm³) than the non-exposed group. Among the exposed group, the highest average prostate volume was observed in people who consumed opium (32.9 cm³), while the lowest average was observed in people who consumed refined opium (24.4 cm³). People with HTN in the no opium group had the highest mean prostate volume (41.6 cm³).

In contrast, people with other medical problems had the highest mean prostate volume (41.5 cm³) in the opium consumer group. Smokers had a larger mean prostate volume (32.3 cm³) than non-smokers (27.9 cm³) in all 174 patients. This pattern was also observed in the exposed group, where smokers had a larger mean prostate volume compared to non-smokers (29.2 cm³ vs 29 cm³). Furthermore, people who consumed opium and its derivatives through a combination of smoking, inhalation, and oral methods had the highest mean prostate volume (35.25 cm³) compared to those who used a single method of consumption. Statistically, no significant differences in mean prostate volume were observed across the exposed group and the non-exposed group ($p = .268$) (Table 1).

Risk Factors for Prostate Volume

The mean of BMI in opium users and non-users was 24.28 kg/m² and 26 kg/m², respectively. These values in the 2 groups were significantly different ($p = .002$). The between-subjects effects analysis showed that there was no significant interaction between opioid consumption and BMI on the prostate volume (Table 2). In contrast, a statistically significant positive correlation was observed between the duration of opioid use and prostate volume among opium users (Spearman's rho = 0.353, $p < .001$).

The results also showed a significant positive correlation between age and prostate volume in both opium users

Table 1. Demographic characteristics of study population

Variables		Addict Patients or Exposed Group (N = 87)	Non-addict Patients or Control Group (N = 87)	p
Age, mean (SD)		52.03 (11.81)	48.83 (13.63)	.098*
Past medical history, n (%)	Diabetes	2 (2.3)	7 (8)	.138#
	HTN	11 (12.6)	8 (9.2)	
	Diabetes and HTN	2 (2.3)	3 (3.4)	
	Other	9 (10.3)	17 (19.5)	
	Patients without past medical history	63 (72.4)	52 (59.8)	
Type of addiction, n (%)	Opium	62 (71.3)	None	–
	Methadone	8 (9.2)	None	
	Refined opium or opium sap	13 (14.9)	None	
	Heroin	4 (4.6)	None	
Way of consumption, n (%)	Oral	13 (14.9)	None	–
	Injection	3 (3.4)	None	
	Smoking	42 (48.3)	None	
	Mixed-method opium consumers	29 (33.3)	None	
Cigarette smoking, n (%)	Yes	79 (90.8)	23 (26.4)	<.001#
	No	8 (9.2)	64 (73.6)	
Duration of addiction, mean (SD)		18.37 (11.59)	None	–
BMI, mean (SD)		24.28 (4.25)	26 (3.06)	.002*
Prostate volume, mean (SD)		29.2 (11.06)	29.9 (15.59)	.268*

Note: BMI = Body mass index; HTN = Hypertension; SD = Standard deviation.

*Mann–Whitney U-Test

#Chi-square test.

Table 2. Correlation between variables and prostate volume in opium users and non-users

Group	Variable	Spearman's Rho Correlation Coefficient	p (2-tailed)
Opium users	Age	0.476	<.001
	Duration of use	0.353	<.001
	BMI	–0.019	.863
Non-users	Age	0.591	<.001
	BMI	–0.018	.868

Note: BMI = Body mass index.

(Spearman's rho = 0.476, $p < .001$) and non-users (Spearman's rho = 0.591, $p < .001$). This suggests that independent of opioid use, age has a key influence on prostate volume (Table 2).

Discussion

The statistical analysis of the study revealed that none of the previously mentioned variables had a significant association with prostate volume, except for age and the duration of opioid use, which were identified as the only significant predictors of prostate volume.

According to epidemiological research conducted in Iran, prostate cancer is the most frequently diagnosed cancer in men. In 2000, it ranked as the tenth most commonly diagnosed cancer, while in 2016, it had risen to the fifth position (Khanali & Kolahi, 2021). This highlights the significant health challenge posed by prostate cancer in Iran.

Prostate volume has been proven to be a significant indicator of the likelihood of prostate cancer in multiple studies (Haj-Mirzaian et al., 2024). Therefore, identifying the factors

that affect Prostate volume is crucial to efficiently identify individuals at risk of developing prostate cancer. A recent study conducted by Mingyang Sun et al. found an association between long-term opioid use and cancer risk. The incidence rate ratios and hazard ratio of prostate cancer in the opioid group compared to the non-opioid group were 2.00 (1.35–3.03) and 2.85 (1.92–4.00), respectively (Sun et al., 2022). Hence, it is critical to investigate the relationship between opioid consumption and prostate volume. However, the research on the relationship between the consumption of opium and its derivatives and prostate volume is limited, with only 3 studies found on this topic (Abolhasani Foroughi et al., 2023; Hosseini et al., 2012; Safarinejad et al., 2013). In a study conducted by Foroughi et al., the relationship between opium abuse and prostate enlargement was investigated. The results showed that the mean prostate size in the addict group was significantly higher than in the healthy group ($p = .005$). Although the findings were contrary to theirs ($p = .268$), Foroughi et al. found a significant relationship between age and prostate volume ($p < .001$) using logistic regression, which was similar to the findings based on correlation coefficient analysis ($p < .001$). Both sets of findings suggest a direct correlation between age and prostatic volume (Abolhasani

Foroughi et al., 2023). Two other research studies found there is no significant relation between opioid consumption and prostate volume. In the article by Safarinejad et al., the p -value between opioid consumption and prostate volume was .28 for the transition zone volume and .26 for the prostate gland (Safarinejad et al., 2013). Both of the p -values were above .05. In another study conducted by Hosseini et al., there was no significant relation between opioid consumption and prostate volume ($p = .053$) (Hosseini et al., 2012). The articles investigating the link between substance use and prostate volume show varying findings, which could be explained by differences in the molecular pathways. Studies on prostate cancer have found that Kappa opioid receptors are involved in both promoting and inhibiting the growth of prostate cancer cells in vitro and may interact with the androgen cascade. Similarly, the opioid growth factor receptor is highly expressed in prostate cancer cells but repressed by androgens. Mu opioid receptors are found more frequently in prostate cancer tissue and are associated with poor oncologic outcomes (Lec et al., 2020). These findings suggest that opioids can have both promoting and inhibiting effects on prostate cancer cell growth, which may contribute to the differences in prostate volume observed in individuals who consume opioids.

The research suggests that there is no significant correlation between BMI and prostate volume ($p > .05$), which aligns with the findings of a study by Mampa et al., 2021 ($p = .195$). Their study involved 178 men with BPH aged between 50 and 75 years who were seen at Charlotte Maxeke Johannesburg Academic Hospital Urology Outpatient Department between September 2018 and February 2019 (Mampa et al., 2021). However, a study conducted in Zhengzhou on men aged 40 years or older found that prostate volume increased as BMI increased ($r = 0.110$, $p < .001$, p -trend = .045) (Yue et al., 2020). Variations in research findings could be attributed to differences in the racial demographics of the study participants. Additionally, some studies focused on individuals with BPH, while others did not.

One of the aims was to examine the relationship between the duration of opioid consumption and prostate volume. The analysis found a statistically significant correlation between the duration of opioid use and prostate volume ($p < .001$). However, the significant relationship between duration of opium consumption and prostate volume in this study may be due to the longer duration of opioid use in older people, because there is a positive correlation between age and duration of use in this study. In other words, the observed relationship between duration of use and prostate volume may be affected by old age and not duration of use, because the partial correlation analysis showed that there is no significant correlation between duration of opioid use and prostate volume.

Limitations and Directions/Suggestions for Future Research

The study conducted had certain limitations that need to be taken into account. The primary limitation was the relatively

low sample size in subgroups. Besides, the statistical power was approximately 77%, which is slightly below the conventional threshold of 80%. As a result, the study may have been underpowered to detect smaller differences between groups. Furthermore, the study was performed only on Iranian men, and hence, the results cannot be applied to other patient populations. As with many previous studies, this study also had certain limitations, being a single-center study. For definitive evidence of the effects of opium consumption on prostate volume, larger multicenter studies need to be conducted. Regrettably, due to budget constraints, PSA measurements could not be conducted in the patients as part of the research project.

The present study found no statistically significant association between opium addiction and prostate volume. Similarly, no significant relationship was observed between prostate volume and various factors like smoking status, BMI, and past medical history. However, age and the duration of opium consumption were identified as the only significant factors associated with prostate volume.

Author contributions

Conception: T.O., R.N., M.S.M.; Design: M.T., M.H.M., M.S.M.; Supervision: T.O., R.N., S.M.H.; Data acquisition: T.O., M.T., M.H.M., S.R.A., S.B.S., M.R.A.; Data interpretation: T.O., S.M.H., Z.R., M.S.M., M.R.A.; Drafting of the manuscript: T.O., S.M.H., M.S.M., M.R.A.; Critical revision of the manuscript: R.N., M.T., M.H.M., S.R.A., S.B.S., Z.R. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the The Research Ethics Committees of the School of Medicine at Shahid Beheshti University of Medical Sciences (Date: January 1, 2025, Decision/Protocol No: IR.SBMU.MSP.REC.1402.431). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Abolhasani Foroughi, A., Badragheh, J., & Zeinali-Rafsanjani, B. (2023). Is opium addiction a risk factor for benign prostatic hyperplasia? *Tehran University Medical Journal*, 80(12), 974-978.
- Aigbe, E., Irekpita, E., Ogbetere, F. E., & Alili, U. I. (2022). Correlation between prostate volume and prostate-specific antigen in Nigerian men with symptomatic histologically-diagnosed benign prostatic hyperplasia. *Nigerian Journal of Clinical Practice*, 25(9), 1523-1528. [\[Crossref\]](#)
- Awedew, A. F., Han, H., Abbasi, B., Abbasi-Kangevari, M., Ahmed, M. B., Almidani, O., Amini, E., Arabloo, J., Argaw, A. M., & Athari, S. S. (2022). The global, regional, and national burden of benign prostatic hyperplasia in 204 countries and territories from 2000 to 2019: A systematic analysis for the Global Burden of Disease Study 2019. *Lancet. Healthy Longevity*, 3(11), e754-e776. [\[Crossref\]](#)
- Chang, S. L., Harshman, L. C., & Presti, J. C., Jr. (2010). Impact of common medications on serum total prostate-specific antigen levels: Analysis of the National Health and Nutrition Examination Survey. *Journal of Clinical Oncology*, 28(25), 3951-3957. [\[Crossref\]](#)
- Deori, R., Das, B., & Rahman, M. A. (2017). A study of relationship of prostate volume, prostate specific antigen, and age in benign prostatic hyperplasia. *International Journal of Contemporary Medical Research*, 4(7), 1582-1586.
- Devlin, C. M., Simms, M. S., & Maitland, N. J. (2021). Benign prostatic hyperplasia - What do we know? *BJU International*, 127(4), 389-399. [\[Crossref\]](#)
- Hackshaw-McGeagh, L., Lane, J. A., Persad, R., Gillatt, D., Holly, J. M. P., Koupparis, A., Rowe, E., Johnston, L., Cloete, J., Shiridzinomwa, C., Abrams, P., Penfold, C. M., Bahl, A., Oxley, J., Perks, C. M., & Martin, R. (2016). Prostate cancer - Evidence of exercise and nutrition trial (PrEvENT): Study protocol for a randomised controlled feasibility trial. *Trials*, 17(1), 123. [\[Crossref\]](#)
- Haj-Mirzaian, A., Burk, K. S., Lacson, R., Glazer, D. I., Saini, S., Kibel, A. S., & Khorasani, R. (2024). Magnetic resonance imaging, clinical, and biopsy findings in suspected prostate cancer: A systematic review and meta-analysis. *JAMA Network Open*, 7(3), e244258. [\[Crossref\]](#)
- Hosseini, S. Y., Amini, E., Safarinejad, M. R., Soleimani, M., Lashay, A., & Farokhpey, A. H. (2012). Influence of opioid consumption on serum prostate-specific antigen levels in men without clinical evidence of prostate cancer. *Urology*, 80(1), 169-173. [\[Crossref\]](#)
- Joseph, M. A., Wei, J. T., Harlow, S. D., Cooney, K. A., Dunn, R. L., Jaffe, C. A., Montie, J. E., & Schottenfeld, D. (2002). Relationship of serum sex-steroid hormones and prostate volume in African American men. *Prostate*, 53(4), 322-329. [\[Crossref\]](#)
- Khanali, J., & Kolahi, A.-A. (2021). National and subnational cancer incidence for 22 cancer groups, 2000 to 2016: A study based on cancer registration data of Iran. *Journal of Cancer Epidemiology*, 2021, 6676666. [\[Crossref\]](#)
- Kusuma Duarsa, G. W., Sari, Y. A., Gde Oka, A. A., Santosa, K. B., Yudiana, I. W., Wisnu Tirtayasa, P. M., Putra Pramana, I. B., & Klopang, Y. P. (2021). Serum testosterone and prostate-specific antigen levels are major risk factors for prostatic volume increase among benign prostatic hyperplasia patients. *Asian Journal of Urology*, 8(3), 289-297. [\[Crossref\]](#)
- Lec, P. M., Lenis, A. T., Golla, V., Brisbane, W., Shuch, B., Garraway, I. P., Reiter, R. E., & Chamie, K. (2020). The role of opioids and their receptors in urological malignancy: A review. *Journal of Urology*, 204(6), 1150-1159. [\[Crossref\]](#)
- Littrup, P. J., Williams, C. R., Egglin, T. K., & Kane, R. A. (1991). Determination of prostate volume with transrectal US for cancer screening. Part II. Accuracy of in vitro and in vivo techniques. *Radiology*, 179(1), 49-53. [\[Crossref\]](#)
- Mampa, E., Haffeejee, M., & Fru, P. (2021). The correlation between obesity and prostate volume in patients with benign prostatic hyperplasia at Charlotte Maxeke Johannesburg Academic Hospital. *African Journal of Urology*, 27(1), 60. [\[Crossref\]](#)
- Miah, S., & Catto, J. (2014). BPH and prostate cancer risk. *Indian Journal of Urology*, 30(2), 214-218. [\[Crossref\]](#)
- Noweir, A., Abusamra, A., Al Zarooni, A., Binbay, M., Doble, A., Tariq, L., Aziz, F., & El Hasnaoui, A. (2022). Prevalence of benign prostatic hyperplasia among the adult general population of five Middle Eastern Countries: Results of the SNAPSHOT programme. *Arab Journal of Urology*, 20(1), 14-23. [\[Crossref\]](#)
- Pascual Mathey, L. I. P. (2022). Benign prostatic hyperplasia: Epidemiology, pathophysiology, and clinical manifestations. In M. Budak & R. Rajkumar (Eds.), *Molecular mechanisms in cancer*. IntechOpen. [\[Crossref\]](#)
- Press, D. J., Pierce, B., Lauderdale, D. S., Aschebrook-Kilfoy, B., Lin Gomez, S., Hedeker, D., Wright, N. E., Fantus, R. J., Bettencourt, L., Ahsan, H., & Eggener, S. (2020). Tobacco and marijuana use and their association with serum prostate-specific antigen levels among African American men in Chicago. *Preventive Medicine Reports*, 20, 101174. [\[Crossref\]](#)
- Putra, I. B. O. W., Hamid, A. R. A. H., Mochtar, C. A., & Umbas, R. (2016). Relationship of age, prostate-specific antigen, and prostate volume in Indonesian men with benign prostatic hyperplasia. *Prostate International*, 4(2), 43-48. [\[Crossref\]](#)
- Rubinstein, A. L., Carpenter, D. M., & Minkoff, J. R. (2013). Hypogonadism in men with chronic pain linked to the use of long-acting rather than short-acting opioids. *Clinical Journal of Pain*, 29(10), 840-845. [\[Crossref\]](#)
- Safarinejad, M. R., Asgari, S. A., Farshi, A., Iravani, S., Khoshdel, A., & Shekarchi, B. (2013). Opium consumption is negatively associated with serum prostate-specific antigen (PSA), free PSA, and percentage of free PSA levels. *Journal of Addiction Medicine*, 7(1), 58-65. [\[Crossref\]](#)
- Salleh, M. R. (2008). Life event, stress and illness. *Malaysian Journal of Medical Sciences*, 15(4), 9-18.
- Smith, H. S., & Elliott, J. A. (2012). Opioid-induced androgen deficiency (OPIAD). *Pain Physician*, 15(3), ES145-ES156.
- Sun, M., Lin, J.-A., Chang, C.-L., Wu, S.-Y., & Zhang, J. (2022). Association between long-term opioid use and cancer risk in patients with chronic pain: A propensity score-matched cohort study. *British Journal of Anaesthesia*, 129(1), 84-91. [\[Crossref\]](#)
- Toi, A. (2024). The prostate and transrectal ultrasound. In C. M. Rumack (Ed.), *Diagnostic ultrasound* (6th ed., Vol. 1, pp. 440). Elsevier.
- Udoh, E. A., Eyo, A. E., & David, D. E. (2020). Correlation between prostate volume and prostate-specific antigen in patients diagnosed with benign prostatic hyperplasia. *Ibom Medical Journal*, 13(3), 193-199. [\[Crossref\]](#)
- Wang, M. C., Valenzuela, L. A., Murphy, G. P., & Chu, T. M. (2017). Purification of a human prostate specific Antigen1. *Journal of Urology*, 197(2), S148-S152. [\[Crossref\]](#)
- Yue, L., Ge, Y., Wang, T., Ge, M., Zhang, C., & Zhang, W. (2020). The correlation between body mass index and prostatic-related parameters in men 40 years or older in Zhengzhou. *Aging Male*, 23(5), 483-488. [\[Crossref\]](#)

Effects of addiction-related education on the knowledge and awareness levels of civil servants: An intervention in a district of İzmir

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Abstract

This single-group quasi-experimental study was conducted with a pretest-posttest design to measure changes in the knowledge and awareness levels of religious officials in the context of an education program about addiction. Data were collected using the Substance Addiction Awareness Scale and the Substance Addiction Knowledge Test before and after the education given to the participants. Paired-samples t-tests were used in the analyses of the data. After the education program, significant increases were seen in the scores of the participants on the overall Substance Addiction Awareness Scale and all its dimensions except for the personal attitudes and opinions dimension. The results of the Substance Addiction Knowledge Test showed that the knowledge levels of the participants about addiction increased after the education program. The results of this study showed that providing a group of professionals who are in contact with society with education about addiction could increase the awareness and knowledge levels of these professionals.

Keywords: addiction, addiction education, awareness

Main points

- After the education program about addiction, there was an increase in the awareness levels of the participants regarding addiction measured using the Substance Addiction Awareness Scale.
- The scores of the participants of this study on the Substance Addiction Knowledge Test increased significantly after the education program, indicating that they had higher levels of knowledge about substance addiction.
- While the awareness levels of the religious officials in the context of aid and legal regulations, the symptoms and effects of substance usage, and factors causing addiction increased, their personal attitudes and opinions did not significantly change after the education program.

Introduction

As addiction is a chronic mental disorder that is difficult to treat and has a recurrent course, efforts to prevent addiction are becoming increasingly important every passing day (Dabaghi, 2016). The importance of education as an intervention method in the prevention of addiction is emphasized today (Khydyrova, 2015).

Substance abuse is among the risky behaviors that are prevalently seen in adolescents. Substance abuse poses a great threat to the present and future well-being of adolescents. The appropriate follow-up of adolescents is useful in the early identification of substance abuse before the development of addiction. In this context, it was reported that referring adolescents to the relevant institutions had a

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healing effect (Harris et al., 2014). It was stated that preventive programs against substance abuse could be expanded to all areas in which dependable adults interact with adolescents (e.g., sports, counseling programs, child protection units) (Nelson et al., 2022).

It was argued that the prevention of addiction through education is more important than treatment, and this plays an important role in improving welfare (Taghipour et al., 2023). The importance of developing preventive programs increases because the personnel working at healthcare institutions do not have sufficient education on addiction (Englander et al., 2019), studies on early intervention have mostly involved interventions carried out with parents or teachers at schools (Dusenbury et al., 1997; Gorman, 1998), and there is a need for protective and preventive measures (Yoldaş & Demircioğlu, 2020). In addition to these, it is believed that equipping members of professions working at these institutions or civil society organizations with educational activities regarding addiction is also an important field. Intervention programs that have been proven effective in scientific studies and made sustainable through institutionalization may allow practitioners to reduce substance abuse and addiction rates. Hence, the development of preventive, protective, and supportive psychoeducation programs prepared by considering the characteristics of the target audience and with content that is universally valid can contribute to the protection of children and youth from risks (Yoldaş & Demircioğlu, 2020).

In light of all this information, it was considered that it is important to assess an education program developed for religious officials, who are a significant professional group that is in contact with young people. In this study, the aim was to measure the effects of such an education program on the knowledge and awareness levels of religious officials regarding addiction.

Material and Methods

Design and Participants

This single-group quasi-experimental study was carried out with a pretest-posttest design to measure the effects of an addiction-related education program on the knowledge and awareness levels of religious officials regarding addiction.

The target audience of the study included religious officials who contacted individuals in person in the field. In this context, the sample of the study consists of religious officials working in a district of Izmir province in Türkiye. A total of 232 religious officials are employed in this district. The study was carried out with the participation of 94 voluntary participants.

In this study, the sample size was calculated prior to data collection using the "G*Power 3.1.9.2" software with a confidence level of 80%. Based on this, the effect size of the study was determined to be 0.30; with an alpha level of 0.05 and a power of 0.80, the minimum required sample size

was calculated as 71. To prevent data loss, this number was exceeded, and a total of 94 participants were included in the study.

Inclusion and Exclusion Criteria

The inclusion criteria were being voluntary to participate in the study and working as a religious official in the designated district of Izmir. The exclusion criteria were refusing to participate in the study and being off duty, on sick leave, or stationed at another institution during the study period.

Procedure

The education program that was prepared for the study was held with the participants in a conference room in the District Governor's Office building in a district of Izmir on June 15, 2023. Two hundred thirty-two religious officials working in a district of Izmir were invited to participate in the study via an official letter after obtaining ethics committee approval and institutional permissions. Because 40 religious officials working at the Office were off duty, on sick leave, or stationed at another institution during the study period, 192 religious officials were reached. Ninety-four religious officials agreed to participate in the education program and the study. Within the scope of the study, first, general information was provided about the education program. Then, the pretest data collection forms were distributed to the participants, the participants were asked to fill out the forms, and the forms were collected after giving them enough time to complete them. The participants were included in the education program whose contents included information about the period of adolescence and its general characteristics, general information about addiction, legal regulations about addiction, and communication with individuals who are addicted or at risk of addiction. Each session of the program lasted 45 minutes, and the program consisted of four sessions. After the completion of the program, the posttest data collection process was carried out. Following the completion of the education program and the posttest measurements, the participants were given information about counseling, support, and treatment centers for addiction, a list of appropriate institutions to which they could refer individuals who are addicted or at risk of addiction, and the contact information of these institutions. The study was completed after receiving the questions and feedback of the participants and thanking them for their participation. The content of the education program is presented in Table 1.

Hypotheses

H1: The posttest scores of the participants on the Substance Addiction Awareness Scale (SAAS) will be statistically significantly higher than their pretest scores.

H2: The posttest scores of the participants on the Substance Addiction Knowledge Test (SAKT) will be statistically significantly higher than their pretest scores.

Table 1. Education program content

Education Program Sessions	Content
Session 1 Adolescence and Its General Characteristics	The general characteristics of individuals in their adolescent period were introduced, and it was emphasized that individuals in adolescence are the most at-risk group in terms of addiction-involving behaviors.
Session 2 Addiction	General information was provided about addiction and addictive substances.
Session 3 Legal Regulations about Addiction	Information regarding legal regulations about addiction was provided.
Session 4 Effective Communication with Addicted Individuals	Information was provided about issues to be considered while communicating with addicted individuals.

Data Collection Tools

Personal Information Form: This form included questions on the demographic characteristics of the participants, including gender, age, education status, marital status, job characteristics, and institutional information.

Substance Addiction Awareness Scale: The scale, which was developed by Köse et al. (2017), consists of four dimensions named aid and legal regulations, symptoms and effects of substance usage, personal attitudes and opinions, and factors causing addiction. The 4-point Likert-type scale has 27 items. Cronbach alpha internal consistency coefficient for the scale was calculated as 0.88. The scale was used in the study conducted by Baysan Arabacı and Yurtsever (2021) with adults, and its Cronbach's alpha coefficient was found to be highly adequate ($\alpha = 0.86$).

Substance Addiction Knowledge Test: The test, which was developed by Köse et al. (2017), consists of 30 items with the response options of true, false, and do not know. The KR-20 reliability coefficient of the test was calculated as 0.88. The test was used in the study conducted by Baysan Arabacı and Yurtsever (2021) with adults, and the authors reported that the discriminatory power of each item on the test was at the desired level. The KR-20 reliability coefficient of the test was calculated as 0.85.

Data Analysis

The IBM SPSS Statistics 26.00 (IBM SPSS Corp.; Armonk, NY, USA) program was utilized to analyze the data collected in the study. The pretest and posttest data collection form responses of the 94 participants who took part in the education program were reviewed, and after the exclusion of the participants who filled out the forms incompletely, the analyses were carried out on the data of 87 participants. Descriptive statistics were calculated for the demographic characteristics of the participants. It was analyzed whether the scores of the SAAS and SAKT were normally distributed. It was found that the data were normally distributed. The differences between the pretest and posttest scale scores of the participants were tested using the paired-samples *t*-test method.

Ethical Considerations

The ethics committee approval was obtained for the initiation and completion of the study from Ege University (Approval No.: 23-3T/54; Date: March 9, 2023). The institutional permission was obtained for the implementation of the educational intervention. The participants were informed about the study before their participation, and they signed the informed consent form.

Results

Demographic Characteristics

It was determined that 35 (40.2%) of the participants were women, and 52 (59.8%) of them were men. One (1.1%) of the participants was literate (with no formal degree), two (2.3%) were high school graduates, 76 (87.4%) had undergraduate university degrees, and 8 (9.2%) had graduate university degrees. It was found that 72 (82.8%) of the participants were married, and 15 (17.2%) were single. Fifty-seven (65.5%) participants were Quran Course instructors, one (1.1%) was a clerk, one (1.1%) was a teacher, and 28 (32.2%) were muadhdhins. The youngest participant was 19 years old, the oldest participant was 62 years old, and the mean age of the participants was 39.09 ± 8.58 . The mean working duration of the participants was 12.72 ± 9.36 years. The demographic information of the participants is presented in Table 2.

Pretest and Posttest Score Comparisons

Substance Addiction Awareness Scale Total and Subscale Scores

The results of the comparisons of the pretest and posttest SAAS total and subscale scores of the participants are given in Table 3.

The paired-samples *t*-test showed a statistically significant difference between the participants' pretest and posttest total SAAS scores [$t(86) = 7.10, p < .001$]. The total SAAS scores of the participants significantly increased after the education program.

Table 2. Demographic characteristics

Variables	Category	Freq. (n)	Perc. (%)
Age (mean $\pm$ SD), years		39.09 $\pm$ 8.58	
Gender	Female	35	40.2
	Male	52	59.8
Marital status	Married	72	82.8
	Single	15	17.2
Education level	Literate (no formal degree)	1	1.1
	High school	2	2.3
	University	76	87.4
	Graduate	8	9.2
Job	Clerk	1	1.1
	Teacher	1	1.1
	Quran course instructor	57	65.5
	Muadhdhin	28	32.2
Duration of employment (mean $\pm$ SD)		12.72 $\pm$ 9.36	
Total		87	100

Note: SD = Standard deviation.

Table 3. Pretest and posttest substance addiction awareness scale total and subscale scores

Variables		M	SD	T (86)	p	d
SAAS total	Pretest	114.60	8.31	7.10	<.001	7.31
	Posttest	120.16	9.37			
Aid and legal regulations	Pretest	38.88	3.37	3.08	<.05	3.87
	Posttest	40.16	4.33			
Symptoms and effects of substance usage	Pretest	33.77	3.68	8.65	<.001	3.20
	Posttest	36.73	3.28			
Personal attitudes and opinions	Pretest	25.32	2.62	1.05	>.05	3.47
	Posttest	25.71	2.77			
Factors causing addiction	Pretest	16.62	2.25	3.76	<.001	2.31
	Posttest	17.55	2.17			

Note: SAAS = Substance Addiction Awareness Scale; SD = Standard deviation.

The paired-samples *t*-test for the SAAS aid and legal regulations subscale revealed a statistically significant difference between the pretest and posttest scores [$t(86) = 3.08, p < .05$]. The scores significantly increased after the education program.

For the SAAS symptoms and effects of addiction subscale, there was a statistically significant difference between pretest and posttest scores [$t(86) = 8.65, p < .001$]. The SAAS *symptoms and effects of addiction subscale scores* of the participants significantly increased after the education program.

There was no statistically significant difference between the pretest and posttest in the SAAS personal attitudes and opinions subscale scores of the participants [$t(86) = 1.05, p > .05$].

The paired-samples *t*-test for the SAAS factors causing addiction subscale showed a statistically significant difference between pretest and posttest scores [$t(86) = 3.76, p < .001$].

Substance Addiction Knowledge Test Total Scores

The paired-samples *t*-test for total SAKT scores found a statistically significant difference between pretest and posttest scores [$t(86) = 7.90, p < .001$]. The total SAKT scores significantly increased after the education program. The results of the analysis are presented in Table 4.

Table 4. Pretest and posttest substance addiction knowledge test total scores

Variables		M	SD	T (86)	p	d
SAKT total	Pretest	81.32	5.18	7.90	<.001	4.95
	Posttest	85.52	3.25			

Note: SAKT = Substance Addiction Knowledge Test; SD = Standard deviation.

Discussion

Social interventions, which are among the strategies used to prevent addiction, include practices such as education programs addressing all parts of society, public information programs, and programs to establish values against substance abuse in the public sphere. The active participation of society in addiction prevention efforts is achieved through collaborations with professional groups that are in contact with society, gatekeepers, activists, stakeholders, or volunteers (Ögel, 2018). In this context, this study was carried out to raise the knowledge and awareness of religious officials, who constitute one of the groups of professionals who are in contact with society, regarding addiction.

The results of the study showed that after the education program, there was an increase in the awareness levels of the participants regarding addiction measured using SAAS. In the study conducted by Altın (2021), religious leaders were provided with training as educators in the fight against substance addiction, and after the training program, there was an increase in the SAAS scores of the participants. Bağcı Taylan et al. (2019) emphasized that education programs on awareness of substance addiction have an important role in the fight against addiction. Epstein et al. (2002) compared the awareness levels of individuals with addictions and those without addictions and found higher levels of addiction in the latter than in the former. In this sense, an increase in the awareness levels of religious officials, who constitute a group of professionals who are in contact with the public, regarding addiction could be interpreted as them becoming more conscious about preventing addiction and referring individuals at risk of addiction to treatment.

In this study, after the education program, the scores of the participants in the SAAS dimension of aid and legal regulations increased significantly compared to their scores before the program. Individuals with addictions or those in their social circles hesitate to apply for treatment because they fear being reported to the authorities. However, Clause 4 of Article 192 of the Turkish Criminal Code (TCK) states that “where a person who uses narcotics or psychotropic substances makes an application to the authorities with a request to receive treatment before the commencement of any investigation arising from their purchase, receipt, or possession of said narcotics or psychotropic substances, no penalty shall be imposed” (TCK 192). With this clause, the legislator allows the addicted individual to receive treatment and facilitates their reintegration into society by involving persons whose relatives/friends are addicts as influential and persuasive parties (Turan, 2019). Considering the significance of religious officials in Turkish society, it may be argued that increasing their awareness regarding aid and legal regulations would substantially contribute to the fight against addiction.

In comparison to the scores of the participants of this study in the SAAS dimensions of symptoms and effects of substance use and factors causing addiction before the education program, their scores after the education program were significantly higher. In the drama-based education program

organized by Stephens-Hernandez et al. (2007) for the prevention of substance addiction, the awareness levels of the participants regarding substance addiction significantly increased after the drama-based intervention. Altın (2021) provided training to religious leaders as educators in the fight against addiction and after the training program, they found higher levels of awareness regarding factors causing addiction in the experimental group compared to the control group. In the study conducted with university students by Bekircan et al. (2022), high levels of awareness were observed among the participants in the context of “symptoms and effects of addiction” and “factors causing addiction.” In this study, there were increases in the awareness levels of the participants in the context of these dimensions. On the other hand, the scores of the participants of this study in the SAAS dimension of personal attitudes and opinions did not vary significantly after the education program. It is difficult to change personal attitudes and opinions, and it is believed that longer interventions and follow-ups are needed in this sense.

The scores of the participants of this study on SAKT increased significantly after the education program, indicating that they had higher levels of knowledge about substance addiction. The contents of the education program in this study included detailed explanations of the topics “addiction, addictive substances, and their effects,” “legal regulations about addiction,” “communication with addicted individuals,” and “adolescence,” and the knowledge levels of the participants in this context increased after their participation in the program. Theou et al. (2015) provided 53 university students with education on awareness regarding substance addiction, and as a result of the education program, the rate of students who had sufficient knowledge of substance addiction and its consequences increased from 7% to 52.8%. Following the Cigarette, Alcohol, and Substance Addiction Treatment Program (SAMBA) provided to individuals with addictions by Ögel et al. (2016), —which is a structured treatment program designed for cigarette, alcohol, and substance addiction—it was observed that the knowledge levels of the participants regarding addiction increased. Not only the results of this study but also those of other studies in the literature demonstrate that education programs about the fight against addiction increase the knowledge levels of individuals regarding the issue.

In this study, which was carried out to determine the change created by an education program provided to religious officials, who constitute a group of professionals who are in direct contact with the public, in the addiction-related knowledge and awareness levels of these individuals, it was observed that the education program was functional. While the awareness levels of the religious officials in the context of aid and legal regulations, the symptoms and effects of substance usage, and factors causing addiction increased, their personal attitudes and opinions did not significantly change after the education program. In the study, an increase in the awareness levels of a group that is in direct contact with the public regarding the issue in question was facilitated by providing them with education. Nevertheless, it is not clear how these education programs will be reflected

in individuals who experience these problems. For future studies, researchers are recommended to provide addiction-related education to other groups of professionals who are in contact with the public and conduct follow-ups.

Limitations

A limitation of this study was that no sample selection method was used, and those who volunteered to participate were included in the sample. This may indicate that the participants were already sensitive to or interested in the issue of substance addiction, which could limit the generalizability of the results. Another limitation was that no follow-up measurements were made after the posttest measurements made right after the education program. The immediate administration of the measurements may have led to high scores based on short-term recall of the learning material. Therefore, it is recommended that future studies include follow-up assessments to evaluate the long-term effects.

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Author contributions

Conception and design: Y.A., S.A., Y.S.D., Z.Y., İ.Ö.; Data acquisition: Y.A., S.A., İ.Ö.; Data analysis: Y.A., S.A.; Data interpretation: Y.A., S.A., Y.S.D., Z.Y.; Drafting of the manuscript: Y.A., S.A., Y.S.D.; Critical revision of the manuscript: Y.A., S.A., Z.Y., İ.Ö. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Ege University (Date: March 9, 2023, Decision/Protocol No: 23-3T/54). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data supporting the findings of this study are not publicly available due to ethical restrictions and participant confidentiality requirements.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Altın, A. (2021). *Madde bağımlılığı ile mücadelede dini lider eğitici eğitim programının farkındalık oluşturma ve öz-yeterlik üzerine etkisi* (Thesis No. 704504) [Doctoral dissertation, Ondokuz Mayıs University]. Council of Higher Education National Thesis Center.
- Bağcı Taylan, Ş., Nas, İ., & Ediz, Ç. (2019). Sağlıklı yaşam seminerine katılan öğrencilerin madde bağımlılığı ile ilgili farkındalıkları. *Bağımlılık Dergisi*, 20(4), 197-205.
- Baysan Arabacı, L., & Yurtsever, B. (2021). Madde bağımlılığı farkındalık ölçeği'nin ve madde bağımlılığı bilgi testi'nin erişkinlerde geçerlilik ve güvenilirliği. *Fenerbahçe Üniversitesi Sağlık Bilimleri Dergisi*, 1(3), 206-225.
- Bekircan, E., Ün, İ., İçcan Ayyıldız, N., & Usta, G. (Mart 2022). Üniversite öğrencilerinde madde bağımlılığı farkındalığı benlik saygısı ilişkisi. *Bağımlılık Dergisi*, 231, 1-7. [Crossref]
- Dabaghi, P., & Valipour, H. (2016). Effectiveness of a multidimensional prevention program on reducing substance trends among young people. *Addicta: The Turkish Journal on Addictions*, 3(1), 77-85. [Crossref]
- Dusenbury, L., Falco, M., & Lake, A. (1997). A review of the evaluation of 47 drug abuse prevention curricula available nationally. *Journal of School Health*, 67(4), 127-132. [Crossref]
- Englander, H., Mahoney, S., Brandt, K., Brown, J., Dorfman, C., Nydahl, A., Weimer, M., & Gregg, J. (2019). Tools to support hospital-based addiction care: Core components, values, and activities of the improving addiction care team. *Journal of Addiction Medicine*, 13(2), 85-89. [Crossref]
- Epstein, J. A., Griffin, K. W., & Botvin, G. J. (2002). Positive impact of competence skills and psychological wellness in protecting inner-city adolescents from alcohol use. *Prevention Science*, 3(2), 95-104. [Crossref]
- Gorman, D. M. (1998). The irrelevance of evidence in the development of school-based drug prevention policy, 1986-1996. *Evaluation Review*, 22(1), 118-146. [Crossref]
- Harris, S. K., Louis-Jacques, J., & Knight, J. R. (2014). Screening and brief intervention for alcohol and other abuse. *Adolescent Medicine: State of the Art Reviews*, 25(1), 126-156. [Crossref]
- Khydyrova, A. V. (2015). Information openness of the education system as a resource for prevention of antisocial behavior: Domestic and foreign experience. *Electronic Journal Obshestvo. Kultura. Nauka. i Obrazovanie*, 3.
- Köse, Ö. E., Gül, Ş., & Keskin, B. (2017). Ortaöğretim öğrencilerinin madde bağımlılığı ile ilgili farkındalık ve bilgi düzeylerinin incelenmesi. *Bağımlılık Dergisi*, 18(1), 8-15.
- Nelson, L. F., Weitzman, E. R., & Levy, S. (2022). Prevention of substance use disorders. *Medical Clinics of North America*, 106(1), 153-168. [Crossref]
- Ögel, K. (2018). *Bağımlılık ve tedavisi temel kitabı*. B. IQ Kültür Sanat yayınları.
- Ögel, K., Bilici, R., Bahadır, G. G., Maçkan, A., Orhan, N., & Tuna, O. (2016). Denetimli serbestlikte, sigara, alkol madde bağımlılığı tedavi programı (SAMBA) uygulamasının etkinliği. *Anadolu Psikiyatri Dergisi*, 17(4), 270-277.

- Stephens-Hernandez, A. B., Livingston, J. N., Dacons-Brock, K., Craft, H. L., Cameron, A., Franklin, S. O., & Howlett, A. C. (2007). Drama-based education to motivate participation in substance abuse prevention. *Substance Abuse Treatment, Prevention, and Policy*, 2, 11. [Crossref]
- Taghipour, E., Vizesfar, F., & Zarifsanaiey, N. (2023). The effect of gamification-based training on the knowledge, attitudes, and academic achievement of male adolescents in preventing substance and internet addiction. *BMC Medical Education*, 23(1), 860. [Crossref]
- Theou, C. T., Nayak, A. K., & Jose, T. T. (2015). A study to determine the effectiveness of an awareness programme on knowledge on substance abuse and its consequences among the students of a selected pre university college of Udupi district, Karnataka. *Journal of Health and Allied Sciences NU*, 5(1), 53-57. [Crossref]
- Turan, H., & Kodal, O. (2019). Uyuşturucu veya uyarıcı madde kullanma suçları yönünden kamu görevlisi ile sağlık meslek mensuplarının suçu bildirmemesine yönelik düzenlemenin etkin pişmanlık kurumuna etkisi. *Uyuşmazlık Mahkemesi Dergisi*, 13, 501-522.
- Türk Ceza Kanunu. (2024, October 12). *Resmî Gazete* (No: 25611). <https://www.mevzuat.gov.tr/mevzuat?MevzuatNo=5237&MevzuatTur=1&MevzuatTertip=5>
- Yoldaş, C., & Demircioğlu, H. (2020). Madde kullanımı ve bağımlılığını önlemeye yönelik psikoeğitim programlarının incelenmesi. *Bağımlılık Dergisi*, 21(1), 72-91.

Development and validation of caregiver's attitudes toward drug addict's recovery scale

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Abstract

Caregiver's attitudes toward recovery of their drug addicted loved one significantly influence their behavioral orientation toward recovery, adherence to treatment procedures, and sustainability of sobriety. There is, however, a lack of any scale for its assessment, and thus the present study aimed to develop and validate the caregiver's attitudes toward drug addict's recovery scale. In-depth interviews were conducted with caregivers (N = 17, Mage = 39.35), and interpretative phenomenological analysis was used to generate superordinate themes of beliefs, negative feelings, and active involvement toward recovery. The items for each theme were generated, and after content validity, a pool 44 items was obtained. The factor structure of the scale was determined on a sample of 284 caregivers (Mage = 39.57), resulting in four subscales (i.e., negative recovery expectations, positive recovery expectations, emotional resentment, therapeutic pessimism) explaining 49.01% variance. The construct validity was assessed through confirmatory factor analysis (N = 400, Mage = 43.38), demonstrating good indices of fit for 42 out of 44 items. The convergent and discriminant validity of the retained item pool with scores on internalized stigma demonstrated a significant positive correlation with negative recovery expectations, emotional resentment, and therapeutic pessimism, whereas there was no correlation with positive recovery expectations. The reliability coefficients for subscales ranged from 0.77 to 0.92. The caregiver's attitudes toward drug addict's recovery scale is thus a psychometrically sound tool for the assessment of caregiver's attitudes toward drug addict's recovery in Pakistan.

Keywords: attitude, caregivers, drug addicts, Pakistan, recovery, scale development

Main points

- Caregiver's attitudes toward recovery of their drug addicted loved one significantly influence adherence to treatment and sustainability of sobriety.
- Study aimed to develop and validate a scale for assessment of caregiver's attitudes toward recovery.
- Caregiver's attitudes toward drug addict's recovery scale (CADRS) is a 42-item scale with a four-factor structure explaining 49.01% of total variance
- The CADRS and its subscales (negative recovery expectations, positive recovery expectations, emotional resentment, therapeutic pessimism) have a high value of Cronbach's alpha reliability coefficient (≥ 0.77)
- The convergent and discriminant validity of CADRS was also assessed by using internalized stigma of substance use for caregivers Urdu.

Introduction

Attitudes refer to the individual's evaluation of an object through the integration of cognitions and affects associated with that object (Crano & Prislin, 2006). McLeod (2018) elaborated attitude in terms of its affective, behavioral, and cognitive components. In the context of drug addicts' recovery, the literature highlighted caregivers' feelings of fear, anger, uncertainty, loss, and hopelessness associated with

the recovery of their loved one (Horváth & Urban, 2019; Thein et al., 2021). It is also evident that families experience low hope, which might lead to disintegration in seeking opportunities for recovery for their drug addicted loved one (Chen et al., 2022). The qualitative studies (Best et al., 2016; Dekkers et al., 2020) also revealed certain beliefs of caregivers about recovery of their loved one, such as unrealistic expectations from drug addicts and the recovery process; recovery as impossible no matter how much a drug addict or their caregivers try; and

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the relational process of recovery, where caregivers and drug addicted family members need to have joint efforts toward recovery from drug addiction. The disease model of drug addiction (Jellinek, 1960) also highlighted the belief that drug use is like a disease and recovery is not in the drug addict's voluntary control. The free-will model of drug addiction, on the contrary, considers it as voluntary behavior characterized by willfulness and responsibility (Schaler, 1991) thus overemphasizing the personality attributes and the individual's own will for recovery, which also signifies the process of drug addiction treatment. This is because the medical treatment (i.e., detoxification), though improve individual's drug intake for a brief period but it couldn't promise lasting effects without the individual's active participation in the recovery process.

Attitude and behavior are closely associated with each other. The ABC model of attitude elaborates the affective (A), behavioral (B), and cognitive (C) components of attitude. The affective component underlies the feelings or emotions of individuals as associated with the object of attitude. The behavioral component underlies how the attitude shapes and influence the behavior of an individual toward the object of attitude. The third cognitive component of attitude involves an individual's knowledge, beliefs, and thoughts about the object of attitude. A principle associated with the linkage of attitude and behavior is the principle of consistency, which states that attitude is consistent with behavior (McLeod, 2018). Caregivers of drug addicts are evident from the literature to have feelings of fear, anger, uncertainty, and loss associated with the recovery of their loved one (Thein et al., 2021) which forms the affective component of attitude. The literature also provides information about different beliefs of caregivers about recovery of drug addicts (Best et al., 2016; Dekkers et al., 2020) which forms the cognitive component of attitude. Similarly, caregivers demonstrate varied types of perspectives in seeking the treatment of drug addiction (Andersson et al., 2018; Edwards et al., 2018) i.e., the behavioral component of attitude which might be based on the associated affective and cognitive components.

According to the drug-related locus of control model (Ersche et al., 2012) the attitudes related to recovery from drug addiction closely associate with drug locus of control. It refers to how strongly a drug addict believes they have control over their drug addiction. This belief is significantly associated with the attitude toward drug addiction and steps taken toward getting rid of it; that is, treatment adherence and attitude toward treatment (Murphy & Bentall, 1992). The model explains the locus of control related to drug addiction as the extent of control believed by the drug addicts. The individual might believe that the outcome associated with drug addiction is under their personal control (i.e., internal locus of control) or under the influence of external circumstances (i.e., external locus of control) (Rotter, 1966). It is comprised of two components; that is, locus of control for (a) successful recovery and (b) decisions to use drugs. An internal locus of control, according to this model, will result in an individual's active involvement in recovery. It also strongly associates with treatment adherence and thus leads to successful recovery from drug addiction. On the contrary, an external locus of

control attributes its decision to external circumstances, which reduces the individual's involvement in the recovery process and thus hinders the successful process of recovery (Ersche et al., 2012).

Different attitudes are thus associated with different behavioral dispositions. Caregivers' attitudes toward the recovery of their loved one from drug addiction is thus of dire importance to ensure their role in sustained recovery of drug addict. It is also related to the assessment need for caregiver's attitudes toward recovery. The existing scales for attitudes toward sobriety are not specified to this context. Borkin et al. (2000) for instance developed scale for the assessment of recovery from psychiatric disorders. It is a seven items scale evaluating dimensions of recovery as possible and needs faith, and recovery as difficult, which differs among people. It was found to be psychometrically sound for health professionals, people with mental disorders, family members, and others. Likewise, the sobriety support preference scale (Grant & Dill-Shackleford, 2017) is a 40 items measure assessing the preferences of drug users in seeking sobriety support. It was designed to evaluate beliefs and behaviors associated with face-to-face and online support systems. There is also the availability of scales to assess the attitudes of people toward drug addicts and drug addiction (Bryan et al., 2016; Kalebka et al., 2013; Schaler, 1995) but as per the researcher's knowledge, there is no scale yet available to assess caregivers' attitudes toward drug addicts' recovery. The literature from Pakistan also has a gap in this context. Studies in Pakistan, however, are conducted to assess quality of life (Iqbal & Ijaz, 2024), psychological well-being (Ali & Sadiq, 2011), stigma (Rafiq & Sadiq, 2019), and mental health functioning (Suneel et al., 2020) for the family caregivers of drug addicts. The culturally relevant scale in this regard is also of significance to design family-centered interventions and policy frameworks.

Material Methods

The study followed mixed method cross-sectional study design and was accomplished in three phases such that, phase 1 attempt to generate item pool based on qualitative exploration of the construct on caregivers of drug addicts. Phase 2 determined the factor structure of finalized item pool through exploratory factor analysis (EFA). Phase 3 assessed psychometric properties of developed scale including construct validity through confirmatory factor analysis (CFA), convergent and discriminant validity by comparing scores with internalized stigma of substance use for caregivers (ISSAC-Urdu). The design of the study was approved by the ethical committee (Registration No. 0321211002) at the researcher's institutional board for advanced studies and research.

Phase 1: Item Pool Generation

The sample of this phase (Table 1) comprised caregivers of drug addicts ($N = 17$; $\text{Mage} = 39.35$). *It was approached through snowball sampling technique. The inclusion criterion for the sample was that caregivers identify themselves as primary caregivers, involved in a caregiving role for at least*

Table 1. Demographic characteristics for caregivers of drug addicts (N = 17)

	Relation	Area of Residence	Age	Education	Family System	Income Source	Multiple Caregivers
M1	Mother	Lahore	53	Matriculation	Joint	Job	No
M2	Mother	Lahore	50	Graduation	Nuclear	Business	Yes
M3	Mother	Rawalpindi	54	Matriculation	Nuclear	Job	No
Mc1	Mother	Sheikhupura	52	Illiterate	Joint	Pension	No
Mc2	Mother	Rawalpindi	42	Matriculation	Nuclear	Job	Yes
F1	Father	Lahore	56	Intermediate	Joint	Business	No
Fc1	Father	Gujranwala	49	Graduation	Joint	Business	No
W1	Wife	Islamabad	30	Matriculation	Joint	Job	Yes
W2	Wife	Lahore	36	Graduation	Joint	Business	Yes
Wc1	Wife	Mardan	37	Graduation	Joint	Business	Yes
B1	Brother	Lahore	36	Postgraduation	Joint	Job	Yes
B2	Brother	Islamabad	28	Graduation	Joint	Business	Yes
B3	Brother	Islamabad	31	Intermediate	Nuclear	Job	Yes
S1	Sister	Rawalpindi	34	Graduation	Joint	Business	Yes
S2	Sister	Rawalpindi	26	Graduation	Nuclear	Job	Yes
Sc1	Sister	Peshawar	28	Intermediate	Joint	Job	Yes
So1	Son	Islamabad	27	Matriculation	Joint	Job	Yes

the last two years, live with drug addicted loved one, there is just one drug addicted loved one to be cared for, and neither the drug addict nor the caregiver has any psychological problem. In-depth interviews were conducted with the help of an interview guideline covering caregivers' attitudes about the meaning of recovery, ways of recovery, problems during recovery, and the caregiver's role in the recovery for drug addicted loved one. The interviews were recorded after taking proper informed consent from the participants. They were assured of anonymity and confidentiality of the information. The psychological safety of the caregivers was also considered during interviews; that is, not to ask any questions that might act as a trigger for stress. A debriefing session was conducted after each interview. The data obtained was transcribed and analyzed using interpretative phenomenological analysis from descriptive to interpretative understanding of the data (Azungah, 2018) under a hermeneutic approach; that is, consideration for the sociocultural context of caregivers in drawing the meaning of information they provided (Suddick et al., 2020).

Phase 2: Factor Structure for Developed Scale

Phase 2 of the study attempted to determine the factor structure for the developed scale, that is, caregiver's attitudes toward drug addict's recovery scale (CADRS). The objective was accomplished through EFA. Taherdoost et al. (2022) highlighted the significance of EFA for the developed scale because of the limited cultural relevant theoretical basis for the construct. It is essential for identifying the latent constructs underlying a set of observed variables, which helps in defining and representing core dimensions accurately. The majority of items were assessing negative attitudes, so the items assessing positive attitudes toward recovery (1, 2, 4, 5, 6, 9, 14, 15, 16, 37, 38, 39, 40, 41, 42, 43, 44) were reverse coded for the purpose of determining the factor structure. It is also suggested by the literature that reverse coding of

items before EFA helps to obtain stable factor structure and avoid factors merely because of item wordings (Fabrigar & Wegener, 2012). The sample comprised 284 caregivers of drug addicts (Table 2) with ages ranging from 23 to 62 years old ($Mage = 39.57$). The data collection was carried out with the assistance of drug rehabilitation centers in Islamabad, Punjab, Sindh, and Khyber Pakhtunkhwa. All the ethical considerations were taken care of during the stages of data collection, including anonymity, confidentiality, the right to withdraw, and the psychological safety of the participants. The collected data was then analyzed using SPSS 25.

Phase 3: Psychometric Properties of Developed Scale

The main objective of this phase is to determine the validity and reliability of CADRS. Construct validity was determined through CFA such that the items were hypothesized to possess good indices of model fitness. Convergent and discriminant validity were also determined by comparing scores with ISSA-C Urdu such that scores on subscales of negative recovery expectations, emotional resentment, and therapeutic pessimism would associate positively with scores of internalized stigma, whereas they don't associate with subscale of positive attitude toward recovery. The ISSA-C Urdu is the Urdu version of ISSA-C (D'Aniello et al., 2022) translated and validated by the researchers of the present study. It assess internalization of stigmatizing attitudes toward adults with drug addiction signified by alienation, stereotype endorsement, perceived discrimination, social withdrawal, and stigma resistance. The scale comprised of 29 items rated on a four-point Likert type scale such that 1 denotes strongly disagree, 2 denotes disagree, 3 denotes agree, and 4 denotes strongly agree. The total range of scores on the scale is from 1 to 116. Items 7, 14, 24, 26, and 27 of the scale are reverse coded. A sample of 400 caregivers of drug addicts ($Mage = 43.38$) was approached through snowball sampling technique with the assistance of drug rehabilitation centers in Islamabad,

Table 2. Demographic characteristics of the sample for factor structuring (N = 284)

Variables		Frequency	Percentage	Missing
Relation with drug addict	Father	57	20	
	Mother	31	10	
	Wife	22	8	
	Brother	72	25	
	Sister	26	9	
	Son	19	7	
	Daughter	17	6	40
Age	≤25 years old	46	16	
	≤45 years old	87	31	
	≤65 years old	68	24	83
Education	≤10 years of education	19	7	
	10 years of education	22	8	
	12 years of education	36	13	
	14 years of education	37	13	
	16 years of education	57	20	
	≥18 years of education	25	9	88
Province	Islamabad	41	14	
	Punjab	98	35	
	Sindh	23	8	
	Khyber Pakhtunkhwa	55	19	67
Duration of loved one's drug usage	1–3 years	96	44	
	4–6 years	49	17	
	7–9 years	27	10	
	10–13 years	28	10	
	≥14 years	84	29	0
Multiple caregivers	Yes	146	51	
	No	65	23	73

Punjab, Sindh, and Khyber Pakhtunkhwa. It comprised of parents, spouses, siblings, and children of drug addicts who were above 20 years old, lived with a drug addict, and had no history of any psychological problem (Table 3). All ethical considerations were taken care of during data collection from caregivers.

Results

Phase 1: Item Pool Generation

The information obtained from caregivers resulted in three major themes for caregiver's attitudes toward drug addict's recovery (Table 4) that are, beliefs (relapse as inevitable, internal-external locus of control for recovery), negative feelings (hopelessness, fear of relapse, frustration, distrust on drug addict, helplessness, distrust on rehabilitation center), and active involvement (access treatment, monitor loved one's activities, compassion toward loved one, engage loved one in healthy activities, provide religious/spiritual guidance) associated with the recovery of drug addicted loved one. This information was used to initially generate an item pool of 72 statements (29 for positive attitudes and 43 for negative attitudes). All the initial items were critically reviewed by the researcher and supervisor to address any issues with

comprehension, redundancy, complexity, ambiguity, and cultural relevance. The response format of a five-point Likert type was also decided at this stage such that 1 denotes *Completely False*, 2 denotes *False*, 3 denotes *Don't Know*, 4 denotes *Completely True*, and 5 denotes *True*. Likert type scales may meet the research needs when researchers are interested in measuring attitude, belief, or behavior items as they improve understanding and thus increase response rate and response quality (Krosnick et al., 2018).

The refined item pool (44 items) was then further reviewed by subject matter experts (SMEs) to establish content validity. The experts included two assistant professors and three PhD scholars of Psychology who have experience in scale development. For five experts, the recommended content validity ratio (CVR) for each item is 1.00 (Ayre & Scally, 2014; Lawshe, 1975). All 44 items were considered essential for the assessment of the construct. Item 35 was, however, considered poorly structured by one expert and thus rephrased. The CVR for the items is thus greater than 1.00, and thus all 44 items were retained for the final version. The statements reflected both positive and negative caregivers' attitudes toward drug addicts, such as, "*I believe my loved one will quit drugs if they are made to feel responsible*" (item 6) and "*The accessibility of drugs abstain my loved one to recover from drug use.*" (item 8)

Table 3. Demographic characteristics of the sample for construct validity and psychometric properties (N = 400)

Variables		Frequency	Percentage	Missing
Relation with drug addict	Father	137	34	
	Mother	44	11	
	Wife	32	8	
	Brother	106	26	
	Sister	18	5	
	Son	21	5	
	Daughter	10	2	32
Age	≤25 years old	62	16	
	≤45 years old	129	32	
	≤65 years old	93	23	116
Education	≤10 years of education			
	10 years of education			
	12 years of education			
	14 years of education			
	16 years of education			
	≥18 years of education			
Province	Islamabad	55	14	
	Punjab	168	42	
	Sindh	29	7	
	Khyber Pakhtunkhwa	87	22	61
Duration of loved one's drug usage	1–3 years	86	22	
	4–6 years	119	30	
	7–9 years	37	9	
	10–13 years	23	6	
	≥14 years	131	33	4
Multiple caregivers	Yes	254	64	
	No	102	26	44

Phase 2: Factor Structure for Developed Scale

The factorial structure of caregiver's attitudes toward drug addict's Recovery Scale was examined with the help of EFA technique. Bartlett's test of sphericity was significant ($\chi^2(946) = 7131.60, p < 0.001$), which demonstrates that the items possess adequate common variance for the conduction of factor analysis; that is, items could lead to the definite factor structures by the EFA. Kaiser-Meyer-Olkin Measure of sample adequacy was 0.87, which is close to 1, thus suggesting that the data set is adequate for the factor structuring (Field, 2024). The findings from both of these measures support the decision of factor analysis for the scale. The inter-item correlations generated by EFA demonstrate that the items are not highly correlated (i.e., >0.07), which provides rationale for using an orthogonal type of rotation such as varimax rotation (Osborne, 2015). The scree plot (Figure 1) demonstrate four-factor solution such that factor 1 explains 18.56% variance, factor 2 explains 16.36%, factor 3 explains 7.56%, and factor 4 explains 6.53% of the total variance in caregiver's attitudes toward drug addict's recovery. All the 44 items contribute to 49.01% of the total variance (Table 5) with good factor loadings (>0.30). The factor loadings of items under respective factors are highlighted in bold. The factor naming was done with the help of three SMEs who were PhD scholars with experience in scale development. The subscales were thus labeled as negative recovery expectations (3, 7, 8, 10, 11, 12, 13, 20, 21, 23,

28, 30, 31, 32, 33, 34, 35, 36), positive recovery expectations (1, 2, 5, 6, 9, 14, 15, 16, 37, 38, 39, 40, 41, 42, 43, 44), emotional resentment (4, 24, 25, 26, 27, 29), and therapeutic pessimism (17, 18, 19, 22). "I fear my loved one won't quit drugs even after treatment" (item 3) reflects negative recovery expectations, "I believe that with my persistent efforts, my loved one will abstain from drug use" (item 14) reflects positive recovery expectations, "I feel that I have to make lifelong efforts for recovery of my loved one from drug addiction" (item 25) reflects emotional resentment, and "I believe spending money on my loved one's treatment is a waste" (item 17) reflects therapeutic pessimism.

Phase 3: Psychometric Properties of Developed Scale

The construct validity of the factor structure determined in phase 2 was used to assess model fitness using CFA. The results demonstrate good factor loadings for 42 out of the 44 items (>0.40) showing significant contribution in explaining the construct (Table 6). "I firmly believe that my loved one can quit drug use if they want to" (item 4) and "I believe I need to find a better treatment for my loved one" (item 35) were removed due to poor factor loadings (<0.25). The model fit indices (Table 7) demonstrated that the improvement of model fit from model 1 to model 2 was achieved by the application of error covariances applied between the error

Table 4. Superordinate and subordinate themes of data obtained from Caregivers (N = 17)

Superordinate Themes	Subordinate Themes	Description	Relevant Existing Literature
Beliefs about recovery	Relapse in inevitable	Relapse to drug use always occur after a period of sobriety. "Once someone gets involved in drug use, there's no way stopping them. Family members' attempts to dissuade them are of no use. The person keeps suffering their whole life, and it doesn't make any difference to them." (Fc1)	Edwards et al., 2018
	Internal locus of control	Recovery from drug addiction is in the drug addict's own control thus signified individual involvement. "Drug addiction is not a disease as once treated for a disease you know that the person has now recovered. But it couldn't be like that for an addict until he is willing for sobriety and use his willpower to control the drug addiction." (B1)	No literature support was found
	External locus of control	Recovery from drug addiction is in the control of external circumstances like: Biological factors, "My brother tries a lot to quit drug addiction on his own, but he isn't able to do it. Obviously, addiction changes a person's brain so it isn't in their control to stop using drugs and never have them again." (S1)	(VanDerNagel et al., 2018)
		Early age of onset, "The individuals who start drug use later in life are mature and might be able to control it and recover. But the one who start using drugs at a younger age might not give up drug use ever." (W1)	(Meulewaeter et al., 2022)
		Peer influence, "When the person is young, he think drug use as a fashion symbol. If he have drugs, the friends will appraise and approve him." (B1)	(Karakos, 2014)
		Opportunity to use drugs, "...obviously, when you get a room to practice what you wish too, then you practice it. Once a drug addict thus will stay drug addict forever." (W1)	(Strickland & Smith, 2014)
		Absence of strict action by government against drugs, "There are drug dens everywhere and obviously everyone knows but nobody does anything to control it. Why don't the law enforcement agencies of the government take any action against these drug dens?" (B1)	(Rasheed et al., 2019; Yaqub, 2013)
		Lack of affordable treatment, "Rehabilitation centers ask for a lot of money which is problematic. If there would be a treatment center of government and treat addict for affordable payment, it will be a lot easier for us. We could have then be able to treat our son for at least six months or a year." (F1)	(Lister et al., 2020; Thein et al., 2021)
		Absence of compassion by health professionals, "I got my son treated from a government institute. They have a very non caring attitude. I also launch a complaint to higher authorities but they responded back stating that it isn't their responsibility." (M3)	(Monks et al., 2013)
		Inappropriate treatment procedures, "The center where we last got my husband treated from used some medicines of which he had strong cravings. Then, only a month later, he started using drugs again." (W2)	No literature support was found
		Societal stigma, "It takes a lot of effort to get rid of addiction and even after that, if people keep on calling the person drug addict, then obviously he returns to drug use." (B2)	(Wogen & Restrepo, 2020)
Negative feelings about recovery	Hopelessness	Feeling that recovery from drug addiction is impossible. "Whenever we admit our dad for treatment, he runs away from there. So, what can we do now? There is probably no solution except that he is tied up and kept in hospital forever which obviously is not possible." (So1)	(Nodar, 2012; Thein et al., 2021)
	Fear of relapse	Feeling afraid that the drug addicted loved one will start using the drugs soon after the treatment. "I don't know about the thoughts of other family members at that time, but I used to think a lot about what if God forbids, he starts using drugs again after treatment." (B3)	(Kelly et al., 2018)
	Frustration	Feeling high emotional tiredness and fed up of trying to seek recovery for drug addicted loved one. "There's no place left for us to live with dignity. I can't tolerate this anymore. I wish someone should take him away for treatment and keep him there forever or if a car hits him to death, let it be—just get him out of our lives." (Fc1)	(Shishkova & Bocharov, 2022)
	Distrust on drug addict	Feeling high distrust on loved one for seeking recovery from drug addiction. "We knew he would be using drugs again within 24hrs after treatment...he just can't leave them." (B1)	No literature support was found

Table 4. Continued

Superordinate Themes	Subordinate Themes	Description	Relevant Existing Literature
	Helplessness	Caregivers express helplessness about controlling drug use and any further efforts seems meaningless. "How long I and my husband need to keep caretaking him? We've made so many efforts, but now it just feels like it would be useless to try anymore." (Sc1)	(Settley, 2020; Mikulic et al., 2023)
	Distrust on rehabilitation center	Caregivers mentioned about lacking trust on rehabilitation centers for loved one recovery. "I don't know how they treat our children or what they do with them. In the previous institution where I admitted my child, he was lying unconscious. This institution seems better, but I still am a lot scared and worried about my child's safety here." (Mc2)	No literature support was found
Active involvement for recovery	Access treatment	Avail the treatment opportunities for the drug addicted loved one. "Rehabilitation centers make a perfect routine and all things are properly scheduled. So, treatment is the only best solution for leaving drugs and live a sober life." (B1)	(Cornelius et al., 2017; Edwards et al., 2018; Earnshaw et al., 2019)
	Monitor loved one's activities	Monitor the activities of loved one to assure their abstinence from drug use. "Obviously, he finds comfort in drugs and we can't monitor him so he kept on using drugs. There must be a proper person hired just to stay with him, take care of him, and keep constant check over him." (S1)	(Dekkers et al., 2020; Masood & Sahar, 2014)
	Compassion toward loved one	Stay kind and caring toward the drug addicted loved one to help them recovery from addiction. "The journey of getting rid of drugs is extremely difficult and painful for a drug addict. At this point, he needs the support and care from his family and friends." (B3)	(Bartlett et al., 2013)
	Engage loved one in healthy activities	Engaged the drug addicted loved one in daily healthy activities to sustain their sobriety. "If we keep a person busy in any type of work then his mind does not go towards thoughts of drug addiction." (W2)	(Davidson et al., 2010; Snoek et al., 2016)
	Provide religious/spiritual guidance	Religious/spiritual guidance to drug addicted loved one about harms and consequences of drug use. "Getting rid of drug addiction can be done only if the person realizes that it is ruining his life and relations. In this regard, only God can guide a person, otherwise it is very difficult." (B1)	(Charzynska, 2021; Weinandy & Grubbs, 2021)

terms (Figure 2). This helped to decrease the error variance and hence led to the model fit (Divers et al., 2011; Kim & Kim, 2018). Alpha coefficients show good reliabilities for subscales: negative recovery expectations ($\alpha = 0.92$), positive recovery expectations ($\alpha = 0.89$), emotional resentment ($\alpha = 0.77$), and therapeutic pessimism ($\alpha = 0.79$). Convergent validity was also assessed through correlation estimates. It demonstrates that, as hypothesized internalized stigma is

significantly correlated with negative recovery expectations ($r = 0.24, p = 0.001$), emotional resentment ($r = 0.42, p = 0.000$), and therapeutic pessimism ($r = 0.25, p = .001$). Internalized stigma however don't associate with positive attitude toward recovery ($r = -0.11, p = 0.14$), such that items of this subscale were not reverse-coded for the purpose of determining the discriminant validity of the subscale with ISSA-C Urdu.

Discussion

The study is accomplished in three phases such that phase 1 attempted to generate an item pool based on the information from in-depth interviews with caregivers. The caregivers' attitudes toward drug addicts' recovery were found to be comprised of beliefs, negative feelings, and active involvement in the recovery of drug addicts. The indigenous perspective revealed beliefs of internal locus of control for recovery (active involvement and willingness of drug addicts) and inappropriate treatment procedures for recovery, feelings of distrust on drug addict and rehabilitation centers for efforts of sustained sobriety. The refined item pool consisted of 44 items with good content validity as determined by CVR. The factor structure in phase 2 results in a four-factor solution for the developed scale explaining 49.01% of total variance, such that a high score on the subscale of negative recovery expectations (18 items) demonstrates caregivers' hopelessness, pessimism,

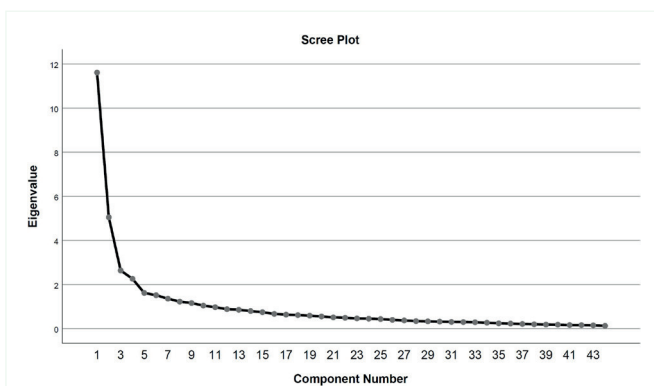


Figure 1. Scree plot for factor structure of caregiver's attitudes toward drug addict's recovery scale

Table 5. Factor loadings and communalities for caregiver's attitudes toward drug addict's recovery scale (N = 284)

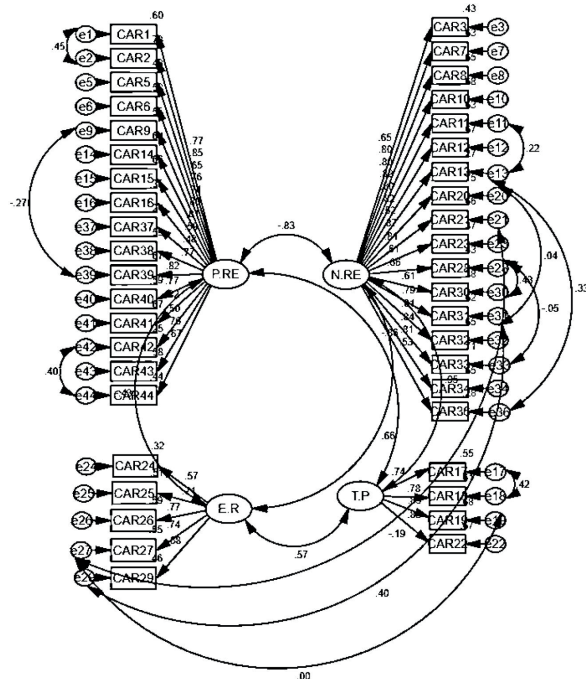
Factor Loadings					
Items	Communalities	Negative Recovery Expectations	Positive Recovery Expectations	Emotional Resentment	Therapeutic Pessimism
33.	0.70	0.81	-0.19		
8.	0.63	0.78	-0.11	0.11	
7.	0.54	0.72		0.14	
10.	0.50	0.70			
32.	0.58	0.68	-0.31	0.14	
31.	0.60	0.67	-0.33	0.18	
20.	0.60	0.63	-0.17	0.15	0.39
12.	0.57	0.62	-0.28		0.31
21.	0.52	0.60	-0.19	0.18	0.32
30.	0.57	0.59	-0.41	0.23	
35.	0.45	0.57	0.28	-0.18	-0.10
11.	0.45	0.57	-0.17		0.32
36.	0.34	0.56			0.15
34.	0.39	0.55	-0.27		0.14
13.	0.46	0.54	0.17	-0.28	0.24
28.	0.47	0.54	-0.35	0.25	
23.	0.28	0.43	-0.14	0.22	0.15
3.	0.45	0.43	-0.37	0.15	0.33
2.	0.54		0.72		-0.15
14.	0.55		0.70		-0.24
15.	0.52	-0.15	0.70		
6.	0.49		0.69		
38.	0.50	-0.19	0.68		
40.	0.55	-0.29	0.67	-0.13	
1.	0.46	-0.12	0.66		-0.12
39.	0.57	-0.34	0.66	-0.16	
41.	0.54	-0.32	0.65		
43.	0.41	-0.33	0.54		-0.10
37.	0.37		0.53	0.24	-0.18
9.	0.41	0.15	0.51	0.23	-0.27
16.	0.37	0.17	0.50	0.23	-0.20
44.	0.33	-0.23	0.50	0.14	
42.	0.27		0.43	0.26	-0.11
5.	0.24	-0.23	0.33		0.27
26.	0.59		0.12	0.74	0.10
27.	0.54		0.13	0.72	0.11
25.	0.54	0.13		0.70	0.17
29.	0.51	0.23		0.65	-0.18
24.	0.36		0.18	0.51	0.25
4.	0.45	0.14	0.40	0.248	-0.23
18.	0.68	0.22	-0.14		0.78
17.	0.60	0.34		0.20	0.67
22.	0.52	0.44	-0.12		0.55
19.	0.54	0.41	-0.32	0.18	0.49
Eigen values		11.61	5.05	2.64	
Percentage of variance explained		20.38	16.10	7.39	
Cumulative percentage			36.49	43.87	

Table 6. Factor loadings (standardized regression weights) for caregiver's attitudes toward drug addict's recovery scale (42-items) (n = 400)

Negative Recovery Expectations		Positive Recovery Expectations		Emotional Resentment		Therapeutic Pessimism	
Items	Factor Loadings	Items	Factor Loadings	Items	Factor Loadings	Items	Factor Loadings
3.	0.65	1.	0.77	24.	0.57	17.	0.74
7.	0.79	2.	0.85	25.	0.71	18.	0.78
8.	0.80	5.	0.65	26.	0.77	19.	0.83
10.	0.82	6.	0.76	27.	0.74	22.	0.82
11.	0.79	9.	0.74	29.	0.67		
12.	0.82	14.	0.80				
13.	0.52	15.	0.81				
20.	0.87	16.	0.59				
21.	0.81	37.	0.48				
23.	0.61	38.	0.77				
28.	0.65	39.	0.82				
30.	0.61	40.	0.77				
31.	0.79	41.	0.82				
32.	0.81	42.	0.50				
33.	0.84	43.	0.76				
34.	0.80	44.	0.66				
36.	0.53						

Table 7. Confirmatory factor analysis of caregiver's attitudes toward drug addict's recovery scale (indices of model fit) (n = 400)

Model	X2	df	p	CMIN/df	Fit Indices				
					CFI	NFI	TLI	RMSEA	SRMR
Model-1 first order CFA (44 items—without error covariances)									
	3817.04	813	.00	4.69	0.79	0.75	0.77	0.10	0.07
Model-2 first order CFA (42 items—with error covariances)									
	2104.53	759	.05	2.77	0.91	0.88	0.90	0.06	0.04

**Figure 2.** Measurement model of caregiver's attitudes toward drug addict's recovery scale

and perceived barriers to the recovery of their loved ones. The high score on the subscale of positive recovery expectations (16 items) demonstrates caregivers' hope, trust, and belief in recovery through support and treatment. Similarly, a high score on emotional resentment (6 items) indicates feelings of being tired, irritated, frustrated, and on the verge of giving up the efforts to seek recovery for drug addicted loved ones. Likewise, the high score on the subscale of therapeutic pessimism (4 items) demonstrates hopelessness and skepticism about the worth of treatment seeking for recovery. Both of the aforementioned subscales closely associate with subscale of negative recovery expectations but appear as an independent factors for the construct. The factor loadings and communalities (i.e., unique variance) were found to be high for all the items which demonstrates reliable and valid nature of the scale (Gaskin & Happell, 2014).

Phase 3 of the study carried out the construct validity of CADRS. The factor loadings for 42 out of 44 items were good (>0.50) (Table 6). The item 4, "I firmly believe that my loved one can quit drug use if they want to" and item 35, "I believe I need to find a better treatment for my loved one" were removed due to poor factor loadings (<0.25). Literature also demonstrates that items with low factor loadings need to be considered for removal as they depict poor representation of the construct (Hair et al., 2010). Item 4 measures belief in trust on loved one about willingness to abstain from drug

use. The reason for poor factor loading could be that another item of the scale assesses the same concept and is more comprehensible, *"I firmly believe that my loved one could quit drug use forever"* (item 1). It is also evident from literature that items which are difficult to comprehend by the sample might have a poor contribution to the construct (DeVellis, 2017). The content of item 35, on the other hand, appears to be assessing attitude toward treatment for recovery more specifically than attitude toward recovery, which might be the reason for poor factor loading.

Goodness fit of the model based on 42 retained items for CADRS was achieved by drawing error covariances between the items (Table 7) which results in decreasing the error variance and hence improving overall fitness of the model (Kim & Kim, 2018). It was observed that the error covariances were drawn between the items of different factors (Figure 2) which is indicative that these factors possess a statistically significant relation to one another. The content of the items also provides additional support for the similarity. Error covariance was added between item 1 *"I firmly believe that my loved one could quit drug use forever"* and reverse coded item 27 *"I get very angry with my drug using loved one."* These two statements are associated as when caregiver trusts the loved one for quitting drugs they don't feel angry with them. It is also evident from literature that distrust is associated with feelings of anger (Wallace, 2019). Likewise, there was an error covariance between item 16 *"I believe that in the company of good friends, my loved one will quit using drugs"* showing importance of good company for abstaining from drugs and the reverse coded item 24 *"I feel that drug use is more important to my loved one than my love and sincerity"* indicating consideration of caregiver's loving attitude over drug use. Literature also supports the association between these two statements as good company (Tracy & Wallace, 2016) and caregiver's compassion (Bartlett et al., 2013) could provide help in moving toward a sober lifestyle.

Error variance for reverse coded item 9 *"I believe that if my loved one/relative does not have the opportunity to use drugs, he will quit"* relates to that of item 36 *"I feel that I cannot help my loved one to quit drugs because the treatment is expensive"* and reverse coded item 39 *"I understand that my loved one needs my trust to stop using drugs."* Reverse coding items 9 and 39 shows an absence of hope for recovery even in the absence of opportunity for drug use and trust of the caregiver, respectively. This negative attitude might be associated with similar behavior toward recovery as not being able to seek treatment considering it expensive (item 36). Similarly, a covariance is also added for item 17 *"I think that getting treatment for my loved one is just a waste of money"* and reverse coded item 14 *"I believe that my loved one will stop using drugs with my persistent efforts."* Reverse coded item 14 shows the caregiver's hopelessness that a loved one can't leave drug use no matter how much effort is made, which associates with a negative perspective about treatment for recovery (item 17). Researchers also support that the hopelessness of caregivers might result in restricting efforts toward recovery (Thein et al., 2021).

The error variance for item 29 *"I feel like I can't keep an eye on my loved one all the time to get rid of drug use"* relates to that of item 30 *"I feel that my loved one doesn't want to stop using drugs"* and item 31 *"I feel that my loved one makes no effort to stop using drugs."* Items 30 and 31 demonstrate distrust of the loved one to quit drug use, which relates to the negative attitude of making an effort toward their recovery by constant monitoring (item 29). Distrust by caregivers might affect the efforts to seek recovery; however, literature support for this relation was not found. Error variance for reverse coded item 37 *"I am sure that if my loved one is being watched all the time, he will stop using drugs"* relates to that of item 25 *"I feel that I have to struggle my whole life to get my loved one to quit using drugs"* and item 28 *"I feel that the drug-using loved one isn't concerned about my worries."* Reverse coding item 37 reflects the caregiver's belief that the loved one can't leave drugs even when being watched, which associates with exhaustion in seeking recovery (item 25) and frustration toward the loved one for being unconcerned about the caregiver's worry (item 28). Literature also supports that negative belief or perspective about recovery is associated with exhaustion and frustration (Shishkova & Bocharov, 2022) among caregivers of drug addicts.

The results also demonstrate that the reliabilities for all subscales were high (>0.70) which indicate internal consistency of scores (Hajjar, 2018; Kalkbrenner, 2021). Convergent validity for CADRS was also assessed through high correlation with scores on psychometrically valid instrument(s) assessing the same or similar construct. Likewise, there was an absence of correlation with scores on psychometrically valid instrument(s) assessing a different construct, respectively. Researchers highlight the significance of convergent and discriminant validity in scale development to support its psychometric soundness (Campbell & Fiske, 1959; DeVellis, 2017). In the present study ISSA-C Urdu assessing internalized stigma for caregivers was used to determine convergent and discriminant validity. It is also evident from the literature that a high degree of internalized stigma among caregivers of drug addicts is associated with considering recovery from drug addiction as impossible and stop seeking recovery for drug addict (Corrigan et al., 2019) that is, a negative attitude toward recovery. The results demonstrated that, as hypothesized internalized stigma is significantly correlated with negative attitude toward recovery and feelings of exhaustion during recovery. It is, however, not correlated with a positive attitude toward recovery.

Limitations and Suggestions for Future Research

The major limitation of the present study is that caregivers of only male drug addicts were included as per the convenience of data collection. Future studies may include those of female drug addicts to determine more generalizable psychometric properties of developed scale. Another limitation is the inclusion of only one scale for assessing convergent and discriminant validity of the developed scale. Future researchers could support findings by using some other scales for comparison.

Author contributions

Conception: N.S.; Design: N.S., I.N.; Data acquisition: N.S.; Data analysis: N.S.; Data interpretation: N.S.; Drafting of the manuscript: N.S.; Critical revision of the manuscript: N.S., I.N. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Ethics Committee of Quaid-i-Azam University, Islamabad (Date: February 23, 2021, Decision/Protocol No: 03212111002). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Ali, A. Z., & Sadiq, R. (2011). Psychological problems in wives of adults with substance abuse problem. *Pakistan Journal of Clinical Psychology*, 10(2). <https://pjcpku.com/index.php/pjcp/article/view/114>
- Andersson, C., Best, D., Irving, J., Edwards, M., Banks, J., Mama-Rudd, A., & Hamer, R. (2018). *Understanding recovery from a family perspective: A survey of life in recovery for families*. Sheffield Hallam University for Alcohol Research UK.
- Ayre, C., & Scally, A. J. (2014). Critical values for Lawshe's content validity ratio: Revisiting the original methods of calculation. *Measurement and Evaluation in Counseling and Development*, 47(1), 79-86. [Crossref]
- Azungah, T. (2018). Qualitative research: Deductive and inductive approaches to data analysis. *Qualitative Research Journal*, 18(4), 383-400. [Crossref]
- Bartlett, R., Brown, L., Shattell, M., Wright, T., & Lewallen, L. (2013). Harm reduction: Compassionate care of persons with addictions. *Medsurg Nursing: Official Journal of the Academy of Medical-Surgical Nurses*, 22(6), 349.
- Best, D., Beckwith, M., Haslam, C., Alexander Haslam, S., Jetten, J., Mawson, E., & Lubman, D. I. (2016). Overcoming alcohol and other drug addiction as a process of social identity transition: The social identity model of recovery (SIMOR). *Addiction Research and Theory*, 24(2), 111-123. [Crossref]
- Borkin, J. R., Steffen, J. J., Ensfield, L. B., Krzton, K., Wishnick, H., Wilder, K., & Yangarber, N. (2000). Recovery Attitudes Questionnaire: Development and evaluation. *Psychiatric Rehabilitation Journal*, 24(2), 95-102. [Crossref]
- Bryan, C. J., Yeager, D. S., Hinojosa, C. P., Chabot, A., Bergen, H., Kawamura, M., & Steubing, F. (2016). Harnessing adolescent values to motivate healthier eating. *Proceedings of the National Academy of Sciences of the United States of America*, 113(39), 10830-10835. [Crossref]
- Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin*, 56(2), 81-105. [Crossref]
- Charzyńska, E. (2021). The effect of baseline patterns of spiritual coping, forgiveness, and gratitude on the completion of an alcohol addiction treatment program. *Journal of Religion and Health*, 60(3), 1796-1817. [Crossref]
- Chen, A. T., Johnny, S., & Conway, M. (2022). Examining stigma relating to substance use and contextual factors in social media discussions. *Drug and Alcohol Dependence Reports*, 3, 100061. [Crossref]
- Cornelius, T., Earnshaw, V. A., Menino, D., Bogart, L. M., & Levy, S. (2017). Treatment motivation among caregivers and adolescents with substance use disorders. *Journal of Substance Abuse Treatment*, 75, 10-16. [Crossref]
- Corrigan, P. W., Qin, S., Davidson, L., Schomerus, G., Shuman, V., & Smelson, D. (2019). How does the public understand recovery from severe mental illness versus substance use disorder? *Psychiatric Rehabilitation Journal*, 42(4), 341-349. [Crossref]
- Crano, W. D., & Prislin, R. (2006). Attitudes and persuasion. *Annual Review of Psychology*, 57, 345-374. [Crossref]
- D'Aniello, C., Tambling, R., & Russell, B. (2022). The internalized stigma of substance abuse scale for caregivers: Measuring substance use stigma experienced by caregivers. *Alcoholism Treatment Quarterly*, 40(1), 83-92. [Crossref]
- Davidson, L., White, W., Sells, D., Schmutte, T., O'Connell, M., Bellamy, C., & Rowe, M. (2010). Enabling or engaging? The role of recovery support services in addiction recovery. *Alcoholism Treatment Quarterly*, 28(4), 391-416. [Crossref]
- Dekkers, A., De Ruyscher, C., & Vanderplasschen, W. (2020). Perspectives on addiction recovery: Focus groups with individuals in recovery and family members. *Addiction Research and Theory*, 28(6), 526-536. [Crossref]
- DeVellis, R. F. (2017). *Scale development: Theory and applications* (4th ed., pp. 123). Sage Publications.
- Divers, J., Redden, D. T., Carroll, R. J., & Allison, D. B. (2011). How to estimate the measurement error variance associated with ancestry proportion estimates. *Statistics and Its Interface*, 4(3), 327-337. [Crossref]
- Earnshaw, V. A., Bogart, L. M., Menino, D. D., Kelly, J. F., Chaudoir, S. R., Reed, N. M., & Levy, S. (2019). Disclosure, stigma, and social support among young people receiving treatment for substance use disorders and their caregivers: A qualitative analysis. *International Journal of Mental Health and Addiction*, 17(6), 1535-1549. [Crossref]
- Edwards, M., Best, D., Irving, J., & Andersson, C. (2018). Life in recovery: A families' perspective. *Alcoholism Treatment Quarterly*, 36(4), 437-458. [Crossref]

- Ersche, K. D., Turton, A. J., Croudace, T., & Štochl, J. (2012). Who do you think is in control in addiction? A pilot study on drug-related locus of control beliefs. *Addictive Disorders and Their Treatment*, 11(4), 173-223. [\[Crossref\]](#)
- Fabrigar, L. R., & Wegener, D. T. (2012). *Exploratory factor analysis*. Oxford University Press.
- Field, A. (2024). *Discovering statistics using IBM SPSS Statistics*. Sage Publications.
- Gaskin, C. J., & Happell, B. (2014). On exploratory factor analysis: A review of recent evidence, an assessment of current practice, and recommendations for future use. *International Journal of Nursing Studies*, 51(3), 511-521. [\[Crossref\]](#)
- Grant, D. S., & Dill-Shackleford, K. E. (2017). Using social media for sobriety recovery: Beliefs, behaviors, and surprises from users of face-to-face and social media sobriety support. *Psychology of Popular Media Culture*, 6(1), 2-20. [\[Crossref\]](#)
- Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2010). *Multivariate data analysis: A global perspective* (7th ed., pp. 137). Pearson Education.
- Hajjar, S. T. (2018). Statistical analysis: Internal-consistency reliability and construct validity. *International Journal of Quantitative and Qualitative Research Methods*, 6(1), 27-38.
- Horváth, Z., & Urbán, R. (2019). Testing the stress-strain-coping-support (SSCS) model among family members of an alcohol misusing relative: The mediating effect of burden and tolerant-inactive coping. *Addictive Behaviors*, 89, 200-205. [\[Crossref\]](#)
- Iqbal, M. N., & Ijaz, S. (2024). Exploring psychosocial determinants of quality of life in young adults with paternal substance use disorder in Pakistan: A phenomenological study. *Journal of Substance Use*, 1-6. [\[Crossref\]](#)
- Jellinek, E. M. (1960). *The disease concept of alcoholism*. Hillhouse Press. [\[Crossref\]](#)
- Kalebka, R. R., Bruijns, S. R., & Van Hoving, D. J. (2013). A survey of attitudes towards patient substance abuse and addiction in the Emergency Centre. *African Journal of Emergency Medicine*, 3(1), 10-17. [\[Crossref\]](#)
- Kalkbrenner, M. T. (2021). Alpha, omega, and H internal consistency reliability estimates: Reviewing these options and when to use them. *Counseling Outcome Research and Evaluation*, 14(1), 77-88. [\[Crossref\]](#)
- Karakos, H. L. (2014). Positive peer support or negative peer influence? The role of peers among adolescents in recovery high schools. *Peabody Journal of Education*, 89(2), 214-228. [\[Crossref\]](#)
- Kelly, J. F., Greene, M. C., & Bergman, B. G. (2018). Beyond abstinence: Changes in indices of quality of life with time in recovery in a nationally representative sample of US adults. *Alcoholism: Clinical and Experimental Research*, 42(4), 770-780. [\[Crossref\]](#)
- Kim, S. M., & Kim, H. M. (2018). Effect of observation error variance adjustment on numerical weather prediction using forecast sensitivity to error covariance parameters. *Tellus A: Dynamic Meteorology and Oceanography*, 70(1), 1-16. [\[Crossref\]](#)
- Krosnick, J. A., Judd, C. M., & Wittenbrink, B. (2018). The measurement of attitudes. In *The handbook of attitudes*, 1: Basic Principles (pp. 45-105). Routledge.
- Lawshe, C. H. (1975). A quantitative approach to content validity. *Personnel Psychology*, 28(4), 563-575. [\[Crossref\]](#)
- Lister, J. J., Weaver, A., Ellis, J. D., Himle, J. A., & Ledgerwood, D. M. (2020). A systematic review of rural-specific barriers to medication treatment for opioid use disorder in the United States. *The American Journal of Drug and Alcohol Abuse*, 46(3), 273-288. [\[Crossref\]](#)
- Masood, S., & Us Sahar, N. (2014). An exploratory research on the role of family in youth's drug addiction. *Health Psychology and Behavioral Medicine: An Open Access Journal*, 2(1), 820-832. [\[Crossref\]](#)
- McLeod, S. A. (2018). *Attitudes and behavior*. <https://www.simplypsychology.org/attitudes.htm>
- Meulewaeter, F., De Schauwer, E., De Pauw, S. S., & Vanderplasschen, W. (2022). "I grew up amidst alcohol and drugs:" A qualitative study on the lived experiences of parental substance use among adults who developed substance use disorders themselves. *Frontiers in Psychiatry*, 13, 768802. [\[Crossref\]](#)
- Mikulić, M., Čavar, I., Jurišić, D., Jelinčić, I., & Degmečić, D. (2023). Burden and Psychological Distress in Caregivers of Persons with Addictions. *Challenges*, 14(2), 24. [\[Crossref\]](#)
- Monks, R., Topping, A., & Newell, R. (2013). The dissonant care management of illicit drug users in medical wards, the views of nurses and patients: A grounded theory study. *Journal of Advanced Nursing*, 69(4), 935-946. [\[Crossref\]](#)
- Murphy, P. N., & Bental, R. P. (1992). Motivation to withdraw from heroin: A factor-analytic study. *British Journal of Addiction*, 87(2), 245-250. [\[Crossref\]](#)
- Nodar, M. (2012). Chaotic environments and adult children of alcoholics. *The Professional Counselor: Research and Practice*, 2(1), 43-47. [\[Crossref\]](#)
- Osborne, J. W. (2015). What is rotating in exploratory factor analysis? *Practical Assessment, Research, and Evaluation*, 20(1), 2. [\[Crossref\]](#)
- Rafiq, M., & Sadiq, R. (2019). Caregiver stress, perceived stigma and mental health in female family members of substance users: Correlational Study. *JPMA. the Journal of the Pakistan Medical Association*, 69(9), 1300-1303.
- Rasheed, H., Hoellein, L., Bukhari, K. S., & Holzgrabe, U. (2019). Regulatory framework in Pakistan: Situation analysis of medicine quality and future recommendations. *Journal of Pharmaceutical Policy and Practice*, 12(1), 1-15. [\[Crossref\]](#)
- Rotter, J. B. (1966). Generalized expectancies for internal versus external control of reinforcement. *Psychological Monographs*, 80(1), 1-28. [\[Crossref\]](#)
- Schaler, J. A. (1991). Drugs and free will. *Society*, 28(6), 42-49. [\[Crossref\]](#)
- Schaler, J. A. (1995). The addiction belief scale. *International Journal of the Addictions*, 30(2), 117-134. [\[Crossref\]](#)
- Settley, C. (2020). The physical and psychological wellbeing of caregivers of individuals suffering from substance addiction. *Archives of Psychiatric Nursing*, 34(3), 107-109. [\[Crossref\]](#)
- Shishkova, A. M., & Bocharov, V. V. (2022). The burnout concept as a theoretical framework for investigating the caregiving impact of relatives of patients with addictive disorders. *Psychology in Russia: State of the Art*, 15(3), 111-132. [\[Crossref\]](#)
- Snoek, A., Levy, N., & Kennett, J. (2016). Strong-willed but not successful: The importance of strategies in recovery from addiction. *Addictive Behaviors Reports*, 4, 102-107. [\[Crossref\]](#)
- Strickland, J. C., & Smith, M. A. (2014). The effects of social contact on drug use: behavioral mechanisms controlling drug intake. *Experimental and Clinical Psychopharmacology*, 22(1), 23.
- Suddick, K. M., Cross, V., Vuoskoski, P., Galvin, K. T., & Stew, G. (2020). The work of hermeneutic phenomenology. *International Journal of Qualitative Methods*, 19. [\[Crossref\]](#)
- Suneel, I., Saleem, S., & Mahmood, Z. (2020). Mental health functioning of adult children of alcoholic fathers in Pakistan. *Rawal Medical Journal*, 45(1), 140-143. <https://www.rmj.org.pk/?mno=47507>

- Taherdoost, H., Sahibuddin, S., & Jalaliyoon, N. (2022). Exploratory factor analysis: Concepts and theory. *Advances in Applied and Pure Mathematics*, 27, 375-382. <https://hal.archives-ouvertes.fr/hal-02557344/document>
- Thein, K. Z. K., Herberholz, C., Sandar, W. P., & Yadanar. (2021). Caring for persons with drug use disorders in the Yangon Region, Myanmar: Socioeconomic and psychological burden, coping strategies and barriers to coping. *PLoS One*, 16(10), e0258183. [\[Crossref\]](#)
- Tracy, K., & Wallace, S. P. (2016). Benefits of peer support groups in the treatment of addiction. *Substance Abuse and Rehabilitation*, 7, 143-154. [\[Crossref\]](#)
- VanDerNagel, J. E., van Duijvenbode, N., Ruedrich, S., Ayu, A. P., & Schellekens, A. F. (2018). The perception of substance use disorder among clinicians, caregivers and family members of individuals with intellectual and developmental disabilities. *Journal of Mental Health Research in Intellectual Disabilities*, 11(1), 54-68. [\[Crossref\]](#)
- Wallace, R. J. (2019). Trust, anger, resentment, forgiveness: On blame and its reasons. *European Journal of Philosophy*, 27(3), 537-551. [\[Crossref\]](#)
- Weinandy, J. T. G., & Grubbs, J. B. (2021). Religious and spiritual beliefs and attitudes towards addiction and addiction treatment: A scoping review. *Addictive Behaviors Reports*, 14, 100393. [\[Crossref\]](#)
- Wogen, J., & Restrepo, M. T. (2020). Human rights, stigma, and substance use. *Health and Human Rights*, 22(1), 51.
- Yaqub, F. (2013). Pakistan's drug problem. *The Lancet*, 381(9884), 2153-2154. [\[Crossref\]](#)

Mental health problems and substance use among iraqi adolescents: Retrospective study from the global school-based health survey

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Abstract

Mental health problems and addiction are interconnected public health concerns among adolescents. The objective was to examine the estimated prevalence and identify shared predictors of mental health and addiction problems among Iraqi adolescents using data from the Global School-Based Student Health Survey (GSHS). Data from 1611 students aged 11–16 years were analyzed. Binary outcomes were derived from Global School-Based Student Health Survey items; Chi-square tests and logistic regression examined associations with demographics and psychosocial factors. Overall, 10.3% reported mental health problems and 2.1% exhibited substance use problems. Beyond prevalence, the risk of substance addiction was substantially higher among students with mental health problems; female students had higher odds of mental health problems, while male students had a higher odd of substance addiction. Bullying and the lack of close friendships were strongly associated with substance addictions, and smoking and drug use were strong predictors of mental health distress. Older age and higher grade were associated with increased mental health problems. Emotional distress and risky behaviors co-occur and cluster around social adversities (bullying, weak peer ties) in Iraqi schools. This study provides the first national analysis of Iraq's Global School-Based Student Health Survey data to jointly examine mental health and substance use problems and their shared social predictors, establishing a baseline for trend comparisons. The findings support early integrated, school-based approaches that are gender-responsive, incorporate bullying prevention and peer support structures, and link to cessation and referral pathways in school and primary care systems. These data offer concrete goals for Ministries of Health/Education when updating school health programs and child protection policies.

Keywords: addiction to drugs, addiction to tobacco, adolescence, GSHS, Iraq, mental health, students, substance misuse

Main points

- Mental health problems (10.3%) and Substance use problems(2.1%) were present among Iraqi adolescents aged 11–16 years, highlighting their co-occurrence as an urgent public health problem.
- Gender differences were evident: females were more likely to experience mental health problems, while males were more prone to substance misuse.
- Substance misuse (smoking and drugs) strongly predicted mental health distress, with adolescents who smoked or used drugs showing significantly higher odds of psychological problems.
- Social factors such as bullying and lack of close friendship were powerful predictors of substance addictions, underscoring the critical role of peer relationships in adolescent well-being.
- Although based on the 2012 survey, the results remain reliable and relevant, especially since addiction and mental health problems have become even more prevalent in Iraq since then.

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Introduction

Global Context

Adolescence is typically defined as the age range between 12 and 20; it is a vital developmental stage due to the significant sexual, physical, cognitive, and social changes that occur during this period (di Nicola et al., 2017). Adolescents are inclined to seek pleasure, often leading to risky behavior and impulsivity, such as trying new things, including drugs, smoking, and alcohol (Nath et al., 2022). They are also intent on imitation and are heavily influenced by their peers, further increasing their susceptibility to addiction during this age (World Health Organization [WHO], 2023). Approximately half of all mental health problems in adulthood begin at 14 years of age, but the majority of these problems persist undiagnosed and untreated (WHO, 2023). Suicide is one of the leading causes of death among adolescents worldwide, reflecting serious underlying mental health disorders, stating that suicide is the fourth leading cause of death among 15-19 years of age worldwide (WHO, 2023). Substance use during adolescence is a critical risk-taking behavior that can affect the physical and mental health of adolescents (de la Torre-Luque et al., 2021). Substance addiction refers to a wide range of activities that people engage in compulsively, often regardless of the negative consequences on their health, social life and well-being (Hossain et al., 2024). Such behaviors include substance abuse (smoking, alcohol and methamphetamines) and non-substance-related activities (gambling, Internet use, and video games) (Derevensky, 2019; Santangelo et al., 2022; Truong et al., 2017). The term "addiction" is widely used in society, although it lacks a singular definition. However, the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, suggests that the term can be applied to label severe substance use disorders (Santangelo et al., 2022). Addiction is characterized by an inability to control activities, a preoccupation with the substance or activity, and persistent participation in behavior despite acknowledging its adverse effects (Derevensky, 2019). Substance-related disorders are a major source of morbidity and mortality (Truong et al., 2017). Addiction to various harmful substances has been associated with severe health problems, such as liver damage (due to alcohol), lung cancer, stroke, and heart disease (due to smoking), increased heart rate from marijuana, and damage to dopamine and serotonin neurons in the brain due to drug use (Hossain et al., 2024). Although addiction can affect people of all ages, it is particularly prevalent among adolescents aged 10-19 years (Hossain et al., 2024). In the adolescence period, the most commonly used substances are tobacco and alcohol (de la Torre-Luque et al., 2021). Smoking is one of the most common Substance addictions among adolescents. In 2018, the WHO reported that worldwide, at least one in 10 adolescents aged 13-15 years used tobacco, the prevalence being much higher in some regions, and a significant percentage of this population began to smoke in adolescence (WHO, 2019). In the United States, the Centres for Disease Control and Prevention (CDC) reported that in 2022, among middle and high school students, 24.8% had used any tobacco product and 11.3% reported current use (Park-Lee et al., 2022). Alcohol consumption among adolescents is a major problem

in many countries. Globally, more than a quarter of people aged 15-19 years are current drinkers, totaling 155 million adolescents (WHO, 2023).

Iraq Context

In recent decades, numerous traumatic events have affected the people of Iraq. Since 2003, Iraq has gone through many conflicts, including the US invasion, the sectarian conflict, the occupation of the Islamic State of Iraq and Syria, and the COVID-19 pandemic. Therefore, the psychological profile of Iraq reflects a country heavily impacted by a past marked by trauma and suffering (Ahmed, 2024). In Iraq, the mental health of adolescents is of particular concern due to sustained exposure to battle and instability (Ahmed, 2024; Baiee et al., 2017). Research on the prevalence of mental disorders in Iraq shows a varied range of percentages from 14% to 26% among adolescents. Specifically, a study conducted in Al-Diwaniya Governorate, Iraq, by Suhail (2012), found that the prevalence of mental illness among school students aged 12-18 was 17.46%, in which 7.5% were diagnosed with anxiety disorders and 3.91% with depressive disorders (Suhail, 2012). Currently, mental health and substance use are among the most serious social and public health problems in Iraq, especially among adolescents. Smoking among adolescents is also a growing concern in Iraq. Evidence from national data indicates that substance use and addiction are increasing. A recent study showed that the number of patients treated for substance abuse in Iraqi health institutions increased steadily from 2979 in 2017 to 6101 in 2021. Similarly, the number of people prosecuted in Iraqi courts for substance-related charges more than doubled from 6393 to 14,391 during the same period, with Baghdad bearing more than half the institutional burden (50.1%). The most abused substances among the treated patients were alcohol (37.8%) and medications (22.6%), while court records showed that substance abuse cases represented 65.65% of all related proceedings (Muzil et al., 2023). In a separate study on the use of tobacco and nicotine products among young Iraqis, 41.79% reported using traditional cigarettes, 31.1% used electronic cigarettes, and a staggering 94% reported using waterpipes (Faeq et al., 2024).

Research Gap and Objective of the Study

Despite the issues of addiction and substance use and related to mental health in Iraq, there is a significant research gap on the mental health dimensions of addiction among Iraqi adolescents, particularly within the school context. Most existing studies focus on adults or on substance use prevalence alone, with little exploration of its psychological correlates or the co-occurrence of mental health problems and substance use behaviors. Furthermore, due to the cultural stigma surrounding addiction, access to data is often limited and reporting is inconsistent, making adolescent-focused research scarce. Recognizing these challenges, both the Iraqi government and non-governmental organizations have recently initiated awareness campaigns, introduced addiction education programs in universities, and opened treatment centers targeting youth. These efforts reflect a

growing recognition of the psychological and social impact of addiction, particularly within the educational system. The Global School-Based Student Health Survey (GSHS) delivers the most recent nationally representative dataset that matches mental health indicators and substance use behaviors for Iraqi adolescents aged 11-16 years. Therefore, this study was conducted as part of efforts to scientifically quantify the prevalence and interrelationship of mental health problems and substance use behaviors among adolescents in Iraq. Using data from the GSHS, the present study aims to provide evidence-based insight into the scope of the problem in intermediate schools, helping inform future interventions in the educational and health sectors. This study aims to answer these research questions.

1. What is the prevalence of mental health problems and substance use behaviours among Iraqi adolescents aged 11-16 years?
2. What demographic characteristics such as (age and sex) and psychosocial factors are associated with mental health problems and substance use behaviors?
3. How do mental health problems and substance use behaviors co-occur?

Material and Methods

Study Design, Setting, and Participants

This retrospective cross-sectional study used secondary data from the 2012 Iraq GSHS (<https://extranet.who.int/ncdsmicrodata/index.php/catalog/104>). The GSHS is a school survey conducted by the Iraqi Ministry of Health in collaboration with the WHO and the CDC. The survey targeted 11-16-year-old students enrolled in various intermediate grades in Iraq. The inclusion criteria included all students aged 11-16 years who were enrolled in first, second, or third intermediate grades in the selected schools. In the first stage of sampling, schools were selected with probability proportional to size. In the second stage, classes were randomly selected from these schools. All students present in the selected classrooms on the day of survey administration were eligible and invited to participate. There were no exclusion criteria based on gender, region, or socioeconomic status to preserve national representativeness. This study used secondary data from the GSHS conducted in Iraq. As the dataset is deidentified and publicly available, additional ethical approval and informed consent were not required. The original survey was implemented under the ethical supervision of the WHO and the Iraqi Ministry of Health. The sample size for the Iraq GSHS was determined using WHO guidelines for school-based surveys. A two-stage cluster sampling method was used to obtain a nationally representative sample of adolescents. The final sample of 1608 students was calculated to be sufficient to produce reliable national estimates, taking into account anticipated nonresponse rates, the design effect, and a 95% confidence level with adequate power to detect key indicators of adolescent health behaviors.

Data Collection

The 2012 Iraq GSHS used a two-stage cluster study design to obtain a representative sample of students in the intermediate classes first, second, and third intermediate across Iraq. In the first stage, schools were selected with a probability proportional to their enrollment size. In the second stage, classes were randomly selected from the chosen schools, and all students in these classes were eligible to participate. The survey achieved a school response rate of 94%, a student response rate of 94%, and an overall response rate of 79.05%. A total of 1608 students participated in the survey. The students completed a self-administered questionnaire. The GSHS was developed following WHO standardized tools, which included 10 core modules (alcohol use, diet behaviors, drug use, hygiene, mental health, physical activity, protective factors, sexual behaviors, tobacco use, and violence and unintentional injury) to address the leading global causes of morbidity and mortality among school adolescents. The responses were recorded on a computer-scannable response sheet to facilitate data processing and analysis. The 2012 Iraq GSHS is the most recent nationally representative dataset for Iraqi adolescents that harmonizes both mental health indicators and substance use behaviors, providing a unique baseline for co-occurring risks and allowing comparability with WHO-GSHS reports from other countries and years.

Measures and Variables

Two binary outcomes were analysed: Substance addiction and mental health problems. An adolescent was classified as having Substance misuse problems if they endorsed any of the following: smoked cigarettes at least once in the past 30 days; used any non-cigarette tobacco at least once in the past 30 days; used drugs before age 14; ever used marijuana; current marijuana use in the past 30 days; or ever used amphetamines/methamphetamines. An adolescent was classified as having mental health problems if they endorsed any of the following: felt lonely most or all of the time; were worried about something most or all of the time; seriously considered suicide; made a suicide plan in the past 12 months; attempted suicide in the past 12 months; or reported having no close friends. Demographic variables included age (≤ 11 , 12, 13, 14, 15, 16 years), sex (male/female), grade (first/second/third intermediate), and body mass index (BMI) (underweight, normal weight, overweight, obese). The full wording of the item, the response options and exact coding rules are presented in Table 1.

Statistical Analysis

Descriptive statistics were used to summarize the demographic characteristics of the participants. The Chi-square independence test was used to examine associations between mental health/Substance addictions and demographic variables. Logistic regression analysis was performed to assess the impact of demographic variables on mental health and Substance addictions, with odds ratios (OR)

Table 1. Variable definitions, question codes, and coding rules

Variable Category	Construct	Standard Variable Code(s)	Country Question Code(s)	Missing Variables (Per Dataset Notes)	Coding Rule (Analysis Value)	Notes
Demographic	Age	Q1	Q1	–	Six groups: 11, 12, 13, 14, 15, 16 years	As reported
	Sex	Q2	Q2	–	Male/female	As reported
	Grade	Q3	Q3	–	First/second/third intermediate	As reported
	BMI	Q4–Q5	Q4–Q5	–	Underweight/normal/overweight/obese	Derived per GSHS cut-points
Mental health	Bullying	Q20, Q21	Q37, Q38	–	Q37: “0 days” → No; “1–30 days” → Yes. Q38: “Not bullied in past 30 days” → No; any other response → Yes	Binary recode
	Feelings and friendship	Q22, Q27	Q39, Q40, Q45, Q46	Q41, Q42	Q39–Q40 (feelings): “Never” → No; “Rarely” to “Always” → Yes. Q45 (suicide attempts): “0 times” → No; “1–6+ times” → Yes. Q46 (close friends): “0 friends” → Yes for “no friends”; “1–3+ friends” → No	“No close friends” treated as risk indicator
Substance addiction	Cigarettes and tobacco	Q28, Q33	Q47, Q48, Q49, Q50, Q53, Q54	Q51, Q52	Q47 (age at first cigarette): “Never smoked” → No; “Age 7–16+” → Yes. Q48–Q49 (current smoking/tobacco days): “0 days” → No; “1–30 days” → Yes. Q50 (tobacco other than cigarettes): “Never” → No; “Yes” → Yes. Q53 (current use—frequency): “0 days” → No; “1–7 days” → Yes. Q54 (type): “Neither” → No; “Other” → Yes	Any “Yes” across items → Substance addiction present
	Drugs	(as per GSHS drug items)	Q55, Q56, Q58, Q59	Q57, Q60–Q66	Q55 (age at first drug use): “Never used” → No; “Age 7–16+” → Yes. Q56, Q58, Q59 (ever/current/episodes): “0 times” → No; “1–20+ times” → Yes	Any “Yes” across items → Substance addiction present

Note: GSHS = Global School-Based Student Health Survey.

and 95% CI reported. The Hosmer and Lemeshow tests were used to evaluate the goodness of fit of the logistic regression models. Statistical significance was established at $p < .05$ as well as data analysis was performed using SPSS version 28 (IBM SPSS Corp.; Armonk, NY, USA).

Results

Data from 1611 adolescents were analyzed; 58.1% were boys. Most were 13–16 years old; younger ages were less common. The grade distribution was centered on the second intermediate (41.6%). Most of the participants had a normal BMI (57.2%), with 30.2% underweight and smaller overweight/obese groups. Full details are presented in Table 2.

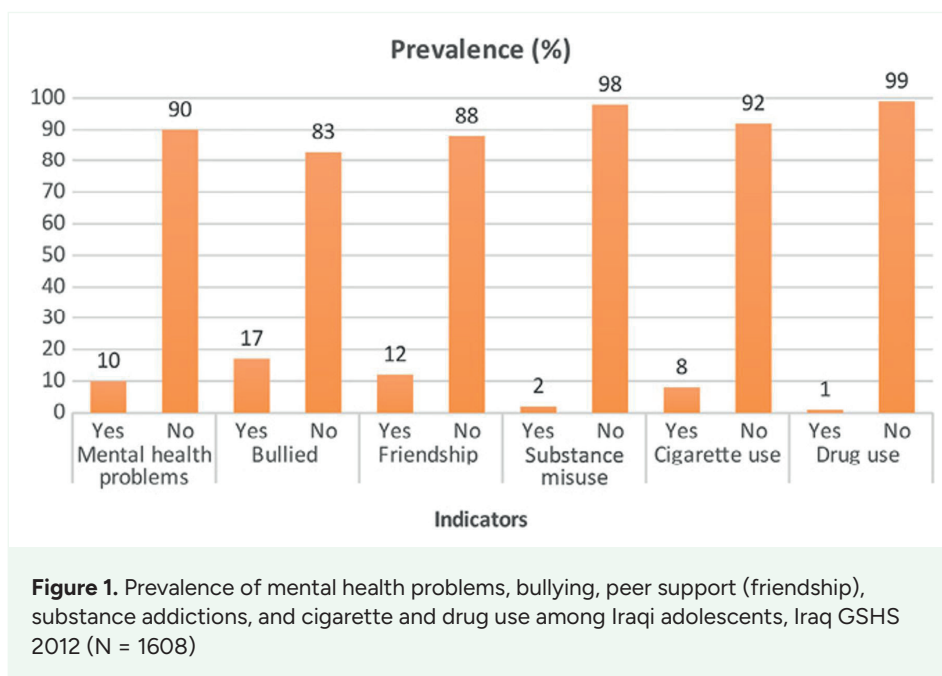
Prevalence of Mental Health and Addictive Problems

As shown in Figure 1, 10% of the students reported mental health problems, while 90% did not. Bullying was reported by 17% of students (83% reported no bullying). Regarding the friendship indicators, which reflect loneliness or social withdrawal, 12% of the students indicated feeling lonely or socially withdrawn (88% did not). Substance misuse problems (composite) was reported by 2% (98% reported none). Cigarette use (past 30 days) was 8% and drug use was 1%.

Table 2. Participant characteristics by sex, age, grade, and BMI (N = 1611)

Variables		N	%
Gender	Male	936	58.1
	Female	675	41.9
Age	≤11	15	0.9
	12	91	5.6
	13	340	21.1
	14	412	25.6
	15	396	24.6
	16	357	22.2
Grade	First Intermediate	536	33.3
	Second Intermediate	670	41.6
	Third Intermediate	405	25.1
BMI	Underweight	486	30.2
	Normal	922	57.2
	Overweight	144	8.9
	Obese	59	3.7

Note: BMI = Body mass index.



Relationships between Demographic Variables, Mental Health, and Substance Addiction

Significant associations were observed between mental health problems and age ($p = .002$), sex ($p = .038$), grade ($p = .021$), smoking ($p < .001$), and drug use ($p < .001$). Mental health problems increased with age, from 6.3% at 14 years to 14.0% at 16 years and older. They were more common among females (12.0%) than males (9.1%), and increased with grade level: 7.8% in first intermediate to 12.1% in the third intermediate. Smoking and drug use were strongly associated with poor mental health: 32.3% of smokers and 56.5% of drug users reported mental health problems compared with 8.5% and 9.5% among non-users, respectively. Similarly, Substance addictions were associated with age ($p = .002$), sex ($p = .019$), bullying ($p < .001$), loneliness or social withdrawal (no friendship) ($p < .001$), and mental health problems ($p < .001$). The prevalence of addiction increased with age, reaching 3.9% among those aged <16 years. Males (2.8%) were more likely than females (1.2%) to report Substance addiction. The rates were higher among students who were bullied (6.4%), those who felt lonely or lacked friends (9.6%), and those with mental health problems (12.2%) compared to their counterparts (1.2%, 1.1% and 0.9%, respectively). No significant differences were found by BMI for either outcome ($p > .6$). Full statistical results are provided in Table 3.

Prediction of Mental Health and Substance Addiction Based on Demographic Characteristics

Mental Health

Multivariate logistic regression indicated that female students had significantly higher odds of reporting mental health

problems (Adjusted Odds Ratio [AOR] = 1.79, 95% CI 1.25-2.57, $p = .002$). The likelihood of mental health problems also increased with grade level, particularly among second-grade students (AOR = 1.69, 95% CI: 1.06-2.69, $p = .028$). Smoking and drug use remained the strongest predictors, with smokers (AOR = 4.49, 95% CI: 2.77-7.27, $p < .001$) and drug users (AOR = 6.94, 95% CI: 2.68-18.03, $p < .001$) showing markedly higher odds of mental health problems. The model explained 10.8% of the variance (Nagelkerke $R^2 = 0.108$), and the Hosmer-Lemeshow test indicated a good fit ($\chi^2 = 5.58$, $p = .694$).

Substance Addiction

In the adjusted model, male students were more likely to report Substance addictions, while being female was protective (AOR = 0.40, 95% CI: 0.17-0.95, $p = .038$). Bullying and loneliness or lack of friendship were the strongest predictors: students who were bullied had 3.6 times higher odds (AOR = 3.58, 95% CI 1.70-7.55, $p = .001$), and those who reported loneliness or no close friends had 8.1 times higher odds (AOR = 8.07, 95% CI: 3.78-17.26, $p < .001$) of substance addictions. The model explained 12.6% of the variance (Nagelkerke $R^2 = 0.126$), with an adequate fit ($\chi^2 = 12.38$, $p = .135$). The complete regression coefficients and CIs are presented in Table 4.

Discussion

This study aimed to examine the prevalence of substance use and its association with mental health problems among adolescents in Iraq aged 11-16 years. The findings revealed a 10.3% prevalence of mental health problems and 2.1% of Substance use problems. Although these data were collected more than a decade ago, they remain significantly relevant for several critical reasons. The 2012 GSHS represents the most

Table 3. Associations between demographic, psychosocial, and behavioral variables with mental health problems and substance addictions among Iraqi adolescents

Variables			Mental Health		Chi-square (p)	Substance misuse		Chi-square (p)
			Yes	No		Yes	No	
Age	≤11	N	2	13	13.153 (.002)	2	13	18.586 (.002)
		%	13.3	86.7		13.3	86.7	
	12	N	10	81		1	90	
		%	11.0	89.0		1.1	98.9	
	13	N	33	307		5	335	
		%	9.7	90.3		1.5	98.5	
	14	N	26	386		4	408	
		%	6.3	93.7		1.0	99.0	
	15	N	45	351		8	388	
		%	11.4	88.6		2.0	98.0	
	16+	N	50	307		14	343	
		%	14.0	86.0		3.9	96.1	
Gender	Male	N	85	851	3.582 (.038)	26	910	4.815 (.019)
		%	9.1	90.9		2.8	97.2	
	Female	N	81	594		8	667	
		%	12.0	88.0		1.2	98.8	
Grade	First intermediate	N	42	494	5.888 (.021)	11	525	0.035 (.982)
		%	7.8	92.2		2.1	97.9	
	Second intermediate	N	75	595		14	656	
		%	11.2	88.8		2.1	97.9	
	Third intermediate	N	49	356		9	396	
		%	12.1	87.9		2.2	97.8	
BMI	Underweight	N	51	435	0.089 (.993)	10	476	1.765 (.621)
		%	10.5	89.5		2.1	97.9	
	Normal	N	95	827		22	900	
		%	10.3	89.7		2.4	97.6	
	Overweight	N	14	130		1	143	
		%	9.7	90.3		0.7	99.3	
	Obese	N	6	53		1	58	
		%	10.2	89.8		1.7	98.3	
Smoking cigarettes	Yes	N	40	84	71.461 (.000)	–	–	–
		%	32.3	67.7				
	No	N	126	1361				
		%	8.5	91.5				
Using drugs	Yes	N	13	10	46.85 (0.000)	–	–	–
		%	56.5	43.5				
	No	N	151	1435				
		%	9.5	90.5				
Being bullied	Yes	N	–	–	–	18	263	30.966 (<0.001)
		%				6.4	93.6	
	No	N				16	1314	
		%				1.2	98.8	
Feeling lonely/ No friendship	Yes	N	–	–	–	18	169	60.658 (<0.001)
		%				9.6	90.4	
	No	N				15	1406	
		%				1.1	98.9	
Mental health	Yes	N	–	–	–	20	144	93.685 (<0.001)

Table 4. Multivariate logistic regression predicting mental-health problems and substance addictions among Iraqi adolescents

Variables	Mental Health					Substance misuse				
	≤11	1	<0.001	1	.140	1	.012	1	<0.001	
Age	12	0.123 (0.064–0.238)	<0.001	1.177 (0.197–7.019)	.858	3.769 (0.775–18.331)	.100	0.084 (0.004–1.617)	.041	
	13	0.107 (0.075–0.154)	<0.001	0.902 (0.166–4.911)	.905	0.272 (0.035–2.098)	.212	0.171 (0.017–1.768)	.138	
	14	0.067 (0.045–0.1)	<0.001	0.491 (0.088–2.737)	.417	0.366 (0.13–1.026)	.056	0.17 (0.016–1.823)	.143	
	15	0.128 (0.094–0.175)	<0.001	0.887 (0.163–4.834)	.890	0.24 (0.078–0.736)	.013	0.24 (0.025–2.325)	.218	
	16	0.163 (0.121–0.22)	<0.001	0.987 (0.18–5.418)	.988	0.505 (0.209–1.219)	.129	0.496 (0.053–4.654)	.539	
	Constant		.014		<0.001		<0.001		<0.001	
Gender	Male	1	<0.001	1	<0.001	1	<0.001	1	<0.001	
	Female	1.365 (0.99–1.884)	.058	1.791 (1.249–2.569)	.002	0.42 (0.189–0.933)	.033	0.404 (0.171–0.953)	.038	
	Constant		<0.001		<0.001		<0.001		<0.001	
Grade	First intermediate	1	.065	1	<0.001	1	.983	1	<0.001	
	Second intermediate	1.483 (0.998–2.203)	.051	1.686 (1.059–2.685)	.028	1.019 (0.459–2.262)	.964	0.731 (0.282–1.89)	.518	
	Third intermediate	1.619 (1.049–2.499)	.030	1.476 (0.846–2.575)	.170	1.085 (0.445–2.643)	.858	0.614 (0.203–1.854)	.387	
	Constant		<0.001		<0.001		<0.001		<0.001	
BMI	Underweight	1	.995	1	<0.001	1	.656	1	<0.001	
	Normal	0.9 (0.684–1.404)	.911	0.909 (0.617–1.339)	.628	1.164 (0.546–2.477)	.694	1.037 (0.457–2.352)	.930	
	Over weight	0.91 (0.493–1.713)	.789	0.916 (0.475–1.767)	.794	0.333 (0.042–2.622)	.296	0.374 (0.045–3.082)	.361	
	Obese	0.96 (0.395–2.358)	.939	0.774 (0.286–2.094)	.614	0.821 (0.103–6.527)	.852	0.914 (0.106–7.898)	.935	
	Constant		<0.001		<0.001		<0.001		<0.001	
	Underweight	1	.995	1	<0.001	1	.656	1	<0.001	
Cigarette	No	1	<0.001	1	<0.001	1	<0.001	1	<0.001	
	Yes	5.144 (3.385–7.816)	<0.001	4.486 (2.767–7.272)	<0.001		<0.001	–	<0.001	
	Constant		<0.001		<0.001		<0.001		<0.001	
Drugs	No	1	<0.001	1	<0.001	1	<0.001		<0.001	
	Yes	12.354 (5.327–28.654)	<0.001	6.944 (2.675–18.029)	<0.001		<0.001		<0.001	
	Constant		<0.001		.001		<0.001		<0.001	
	No		<0.001		<0.001	1	<0.001	1	<0.001	
Bullied	Yes		<0.001		<0.001	5.621 (2.83–11.165)	<0.001	3.583 (1.699–7.553)	.001	
	Constant		<0.001		<0.001		<0.001		<0.001	
	No		<0.001		<0.001	1	<0.001	1	<0.001	
Friendship	Yes		<0.001		<0.001	9.983 (4.94–20.176)	<0.001	8.074 (3.776–17.264)	<0.001	
	Constant		<0.001		<0.001		<0.001		.010	
	-2 Log likelihood				73.734	-2 Log likelihood			257.637 ^a	
Model summary	Cox and Snell R square				0.052	Cox and Snell R Square			0.039	
	Nagelkerke R square				0.108	Nagelkerke R Square			0.216	
	Chi-square				5.581	Chi-square			12.381	
Hosmer and Lemeshow test	p				.694	p			.135	

Percentages are weighted; p values are from design-corrected Chi-square (Rao-Scott) tests.

The cue "a" in the table footnote indicates that the -2 Log Likelihood value corresponds to the final model after adjustment for all variables in the multivariate logistic regression analysis (significant at $p < 0.001$).

recent nationally representative dataset for Iraqi adolescents that measures both mental health problems and Substance use problems using standardized instruments from WHO, which allows international comparisons. Second, these results probably underestimate the current situation, considering the increased use of substances since 2012. For example, the number of patients treated for substance abuse in Iraq more than doubled from 2979 in 2017 to 6101 in 2021, while individuals accused of substance-related charges increased from 6393 to 14,391 during the same period (Muzil et al., 2023). Third, Iraq has changed from a transit region to a production and consumption zone for substances, substantially changing the accessibility and prevalence of substance use among adolescents. Changes in social and digital media suggest that current rates may be higher, as 2012 is a period characterized by greater social conservatism and restricted digital exposure. Therefore, the current study provides not only historical records but also a critical reference fact for trend analysis, allowing authorities to predict, compare, and discourse adolescent psychosocial risks in past, present, and future times. The findings contribute significantly to understanding these issues, especially given the rigorous binary classification applied to the variables to ensure methodological consistency and analytical precision. Despite the fact that the data are from 2012, their continued importance and validity are derived from their status as a national survey conducted collaboratively by the Iraqi Ministry of Health, the WHO, and the CDC, and the absence of comparable national studies examining this specific age group and interconnected issues to date. The findings show that even in 2012, young people in Iraq were already experiencing mental health challenges and addiction, despite living in a time that was arguably less digitally advanced and more socially restricted compared to today's more open society. Currently, addiction has become more widespread and prevalent in Iraq, as the country has transitioned from a transit zone to a production zone for drug use, as evidenced by the data and studies cited in the introduction. These indicate a significant increase in substance use, with the number of patients treated for substance abuse and individuals charged for substance-related charges more than doubling between 2017 and 2021. More recently, a study conducted in Najaf involved 112 young drug users aged 10–29 years, who were interviewed and surveyed about their drug use. Among the participants, 27 were female and 85 were male (Alkhudhairy et al., 2024). Importantly, both mental health problems and substance use behaviors increased with age, particularly among 15 and 16-year-olds, who reported the highest rates. Logistic regression confirmed that older adolescents had significantly higher odds of experiencing emotional distress and using substances. These age-related patterns are consistent with developmental research showing that mid-to-late adolescence is a critical period for the emergence of mental disorders and risky behaviors (Munno et al., 2016; Ranasinghe et al., 2016; Suhail, 2012). Although some regional studies, such as Hossain et al. (2024) in Bangladesh, reported weaker associations, the Iraqi context marked by post-conflict instability, limited youth services, and academic pressure may explain the increased vulnerability among older adolescents. The academic stage also appeared to influence these outcomes. Students in the second and third

intermediate grades reported higher rates of mental health problems and substance use behaviors, with the second grade significantly associated with higher odds (AOR = 1.686). These years often involve increased academic expectations, identity development, and peer stressors. Giota and Gustafsson (2017) observed that perceived mental demands and psychological stress tend to increase during intermediate schooling (Giota and Gustafsson, 2017). Although no statistically significant differences were found by grade specifically for substance use behaviors, the greater increase in both outcomes during these academic years suggests that mental stress may contribute to risky coping behaviors. The gender differences were notable and further reinforced the interconnection between emotional and behavioral health. Female students were significantly more likely to report mental health problems (AOR = 1.791), while males were more likely to engage in substance use behaviors (AOR = 0.404 for females, indicating a reduced risk). This aligns with international evidence suggesting that adolescent girls are more prone to internalizing problems such as depression and anxiety (Baiee et al., 2017), while boys more often externalize distress through behaviors like substance use (Lawrence et al., 2010; WHO, 2009). In Iraq, these patterns have been confirmed in a large-scale retrospective study involving more than 22,000 cases of substance abuse, where over 90% of the affected individuals were male (Younis et al., 2025), with alcohol being the most frequently abused substance. These gender-specific patterns emphasize the need for differentiated prevention strategies that address emotional resilience in girls and behavioral regulation in boys. Key behavioral and social predictors also linked mental health and substance use. Smoking (AOR = 4.486) and drug use (AOR = 6.944) emerged as significant predictors of mental health problems, suggesting that substance use can both result from and exacerbate psychological distress. Meanwhile, social isolation and bullying were strong shared risk factors: adolescents without close friends had significantly higher odds of engaging in Substance addictions (AOR = 8.074), and those who were bullied also had a higher risk (AOR = 3.583). These findings confirm that peer relationships and social safety are central to both emotional well-being and behavioural choices, particularly in adolescence when peer influence is strong and access to formal psychological support is limited. These findings recommend that peer support and school-based anti-bullying programmes may have an indirect protective outcome in decreasing substance use behaviours. In particular, interventions that nurture inclusive peer relationships, teach problem solving skills, and create safe school environments should be prioritised in Iraqi intermediate schools. The adequacy of the model was reassessed using the Hosmer-Lemeshow goodness-of-fit test (corrected for survey design where applicable). For both primary logistic models (mental health problems and Substance addictions), the test did not indicate misfit ($p > .05$), indicating that adjusted associations are not artefacts of model misspecification and are consistent with the multicollinearity and influence diagnostics.

Limitation

There are several limitations to consider in this study. First, the primary constraint is the time of the dataset, which

may not fully capture the current dynamics of adolescent mental health and substance use in Iraq, especially given the recent increase in drug production and use. Second, the operationalization of “substance use behaviors” in the study was restricted to cigarettes, tobacco products, and illicit drugs (marijuana, amphetamines/methamphetamines); behavioral addictions such as gaming, gambling, or internet use were not measured due to survey instrument restrictions. While this limitation reflects the available GSHS items, it means the results discourse substance use specifically rather than the wider range of Substance addictions. Third, reliance on self-reported data introduces potential for recall bias and underreporting due to stigma around mental illness and substance use. Additionally, the cross-sectional design limits causal interpretation, making it difficult to determine the directionality of the observed relationships between variables. Finally, certain subgroups, such as displaced adolescents or those out of school, may have been under-represented in the original survey, reducing the generalizability of the findings.

Implications and Suggestions for Future Research

The findings support several policy and programmatic recommendations.

Integrated school-based interventions: It is recommended to design comprehensive and integrated intervention programs that address both mental health and substance use disorder) and decapitalize the (S) from Substance addictions among Iraqi adolescents. Interventions should be gender-sensitive, recognizing that female students are more vulnerable to emotional distress, while male students are more likely to engage in risk-taking behaviors such as substance use. Schools represent an effective platform for these efforts, where preventive education, peer support programs, and referral systems can be integrated into the academic environment.

National policy updates: Given Iraq’s changing role in regional drug trends—from a transit zone to a production and consumption zone—and the growing evidence of substance use among youth, broader policy responses are urgently needed. These should include increased investment in mental health services, training for school staff and healthcare providers, and nationwide awareness campaigns. Community involvement, particularly with families, educators, and local leaders, will be essential to reduce stigma and build a supportive environment for youth.

Nationally longitudinal representative surveys: There is also a critical need for updated and longitudinal research to track the evolution of adolescent mental health and addiction in Iraq, assess the effectiveness of school and community-based interventions, and inform targeted, evidence-based strategies. Future research should include out-of-school youth and adolescents from high-risk or marginalized communities to capture the full scope of the problem and ensure that interventions are both equitable and comprehensive.

To conclude, this study highlighted the significant co-occurrence of mental health problems and substance use behaviours among Iraqi adolescents aged 11-16, even in a period marked by more conservative social structures and lower digital exposure. The findings reveal that older students and females are particularly vulnerable to emotional distress, while substance use behaviors increase with age and are more common among males. Factors such as smoking, drug use, bullying, and lack of close friendships emerged as key predictors, reinforcing the interconnected nature of emotional and behavioral health in adolescence. Although based on data from 2012, the study provides a foundational reference point for understanding and responding to psychosocial risks in Iraq. As addiction becomes more prevalent in the country and mental health challenges persist, these findings emphasize the urgent need for early, integrated school-based interventions, supported by robust policies and community engagement, to promote healthier development outcomes for Iraqi youth present and future.

Alignment with the United Nations Sustainable Development Goals

This study aligns closely with the United Nations Sustainable Development Goals, particularly *SDG 3: Good Health and Well-being*, by promoting early detection and prevention of mental health problems and substance use among adolescents. It also contributes to *SDG 4: Quality Education*, as the findings underscore the importance of integrating mental health and psychosocial support within school systems to create safe and inclusive learning environments. Moreover, by addressing bullying, social exclusion, and gender disparities, the study supports *SDG 5: Gender Equality* and *SDG 10: Reduced Inequalities*. Together, these alignments highlight the study’s broader contribution to advancing adolescent well-being, equity, and resilience within Iraq’s education and public health sectors.

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Author contributions

Conception and design: D.R.A.; Data acquisition: D.R.A., H.T.A.B., J.O.A.; Data analysis: D.R.A., H.T.A.B.; Drafting of the manuscript: D.R.A., H.T.A.B., J.O.A.; Critical revision of the manuscript: D.R.A., H.T.A.B., J.O.A. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

Ethics committee approval and informed consent were not required for this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that during the preparation of this study, the following AI-assisted technology was used: During the preparation of this work, the authors used AI to assist with language refinement and structural organization. After using this tool, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

References

- Ahmed, D. R. (2024). The psychological profile of Iraq: A nation haunted by decades of suffering. *Open Health*, 5(1). [Crossref]
- Alkhudairy, M. K., Al-Tufaili, S. A., Al-Qazzaz, A. A., & Al-Mosauy, M. M. (2024). A survey study on drug abuse among young people in Al-Najaf governorate, Iraq. *AIP Conference Proceedings*, 3051(1), Article 030004. [Crossref]
- Baiee, H. A., Kizar, Z. F., Jasim, H. S., & Jasim, S. S. (2017). Prevalence of suicidal ideation among Iraqi secondary school students in Babylon Province during the academic year 2016-2017. *Medical Journal of Babylon*, 14(3), 577-584. <http://www.medicaljb.com>
- de la Torre-Luque, A., Ozeylem, F., & Essau, C. A. (2021). Prevalence of Substance addictions among adolescents from 73 low-and middle-income countries. *Addictive Behaviors Reports*, 14, 100387. [Crossref]
- Derevensky, J. L. (2019). Behavioral addictions: Some developmental considerations. *Current Addiction Reports*, 6(3), 313-322. [Crossref]
- di Nicola, M., Ferri, V. R., Moccia, L., Panaccione, I., Strangio, A. M., Tedeschi, D., Grandinetti, P., Callea, A., De-Giorgio, F., Martinotti, G., & Janiri, L. (2017). Gender differences and psychopathological features associated with addictive behaviors in adolescents. *Frontiers in Psychiatry*, 8, Article 256. [Crossref]
- Faeq, D. T., Ahmed, D. R., Aziz, I. A., & Yildirim, M. (2024). Perceptions and usage of traditional cigarettes, electronic cigarettes, and waterpipes among young and middle-aged adults in Iraq: A descriptive study. *Journal of Ethnicity in Substance Abuse*, 1-12. [Crossref]
- Giota, J., & Gustafsson, J. E. (2017). Perceived demands of schooling, stress and mental health: Changes from grade 6 to grade 9 as a function of gender and cognitive ability. *Stress and Health*, 33(3), 253-266. [Crossref]
- Hossain, S., Chowdhury, P. B., Mohsin, M., & Biswas, R. K. (2024). Addictive behavior and mental health of adolescents aged 11-17 years in Bangladesh in 2014: A cross-sectional study. *Health Science Reports*, 7(7), e2231. [Crossref]
- Lawrence, D., Mitrou, F., Sawyer, M. G., & Zubrick, S. R. (2010). Smoking status, mental disorders and emotional and behavioural problems in young people: Child and adolescent component of the National Survey of Mental Health and wellbeing. *Australian and New Zealand Journal of Psychiatry*, 44(9), 805-814. [Crossref]
- Munno, D., Saroldi, M., Bechon, E., Sterpone, S. C. M., & Zullo, G. (2016). Addictive behaviors and personality traits in adolescents. *CNS Spectrums*, 21(2), 207-213. [Crossref]
- Muzil, J. A., Abdulwahid, D. A., Abed, A. H., & Kammad, Z. A. (2023). Substance abuse in Iraq, quantifying the picture. *Journal of Population Therapeutics and Clinical Pharmacology*, 30(12), 302-313. [Crossref]
- Nath, A., Choudhary, S. G., Dakhode, S. U., Rannaware, A., & Gaidhane, A. M. (2022). Substance abuse amongst adolescents: An issue of public health significance. *Cureus*, 14(11), e31193. [Crossref]
- Park-Lee, E., Ren, C., Cooper, M., Cornelius, M., Jamal, A., & Cullen, K. A. (2022). Tobacco product use among middle and high school students - United States, 2022. *MMWR. Morbidity and Mortality Weekly Report*, 71(45), 1429-1435. [Crossref]
- Ranasinghe, S., Ramesh, S., & Jacobsen, K. H. (2016). Hygiene and mental health among middle school students in India and 11 other countries. *Journal of Infection and Public Health*, 9(4), 429-435. [Crossref]
- Santangelo, O. E., Provenzano, S., & Firenze, A. (2022). Risk factors for addictive behaviors: A general overview. *International Journal of Environmental Research and Public Health*, 19(11), 6583. [Crossref]
- Suhail, H. J. (2012). Prevalence of Mental Disorders among adolescents of secondary schools in Diwaniya governorate. *QMJ*, 8(13), 18-27. [Crossref]
- Truong, A., Moukaddam, N., Toledo, A., & Onigu-Otite, E. (2017). Addictive disorders in adolescents. *Psychiatric Clinics of North America*, 40(3), 475-486. [Crossref]
- World Health Organization. (2009). *Iraq mental health survey 2006/7. Iraq mental health survey*. https://applications.emro.who.int/dsaf/EMRPUB_2009_EN_1367.pdf
- World Health Organization. (2019). *Global Youth Tobacco Survey fact sheet: Iraq, 2019*. https://www.emro.who.int/images/stories/tfi/documents/fs_gyts_iraq_2019.pdf
- World Health Organization. (2023). *Adolescent and young adult health*. <https://www.who.int/news-room/fact-sheets/detail/adolescents-health-risks-and-solutions>
- Younis, N. M., Ahmed, M. M., & Majeed, H. M. (2025). Epidemiological profile of substance abuse in Iraq: Retrospective study. *Journal of Education and Health Promotion*, 14, 255. [Crossref]

From a punitive reflex to a rehabilitative philosophy: The Turkish Judiciary's cognitive challenge with Article 191 of the Turkish Penal Code

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Abstract

This study analyzes the practical implementation and judicial reception of the paradigm shift introduced by Article 191 of the Turkish Penal Code, which reframed the state's response to drug users from a punitive to a rehabilitative model. Employing a qualitative document analysis, the study thematically analyzes 44 purposively sampled decisions from the Criminal General Assembly of the Court of Cassation issued between 2005 and 2024. Findings reveal that the judiciary's adaptation was a complex process marked by initial cognitive resistance, procedural confusion, and the development of counter-principles. Key results include the judiciary's creation of an "incurable offender" profile to set limits on rehabilitation through risk assessment, and the emergence of a "ripple effect" that gave users a unique legal status by interacting with other legal institutions. The study concludes that a significant gap exists between the "law in books" and "law in action," highlighting that the success of legal reforms depends not only on legislative text but also on the adaptive capacity of the judicial system and a holistic anticipation of systemic consequences.

Keywords: drug policy, forensic psychology, judicial discretion, rehabilitative justice, Turkish Penal Code

Main points

- Article 191 of the Turkish Penal Code has transformed the judge's role from a mere "legal technician," who only identifies the crime and imposes a sentence, to a "case manager" who assesses the defendant's social profile and potential for treatment to prescribe the most suitable rehabilitation plan.
- The judicial system faced significant challenges in adapting to the new rehabilitation-centered philosophy and moving away from its entrenched punitive habits. Particularly in the initial period, courts struggled to grasp the abstract benefit of the new law, where a sentence might not be executed if treatment is completed, and erroneously considered a concrete "monetary fine" under the old law as more favorable.
- While the judiciary has adopted the rehabilitation philosophy over time, it has also developed a counter-principle for "offenders who persist in committing crimes," demonstrating that this philosophy is not limitless. The Criminal General Assembly of the Court of Cassation has legitimized lower court decisions that bypass the treatment option and impose direct prison sentences, citing the defendant's past noncompliance and criminal records.
- Decisions for treatment and probation under Turkish Penal Code Article 191 have been found to create a "ripple effect," influencing not only the specific case but also other institutions within the criminal justice system. Notably, because these decisions are not considered finalized "conviction judgments," they have served as a "protective shield" for defendants during the probation period of a Suspension of the Pronouncement of the Judgment.

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Introduction

Drug-related offenses constitute one of the most complex and multifaceted problem areas confronting modern legal systems. The policies adopted by states to combat this issue are fundamentally shaped by two different philosophical approaches: the punitive justice model, which views the drug user primarily as an “offender” who must be punished, and the rehabilitation-oriented justice model, which regards the user as a “patient” who should be treated and reintegrated into society. Which of these two approaches a legal system places at its core fundamentally determines not only the type of sanction imposed on the offender but also the role of the judge, the manner in which evidence is interpreted, and the functioning of the criminal justice system as a whole.

With the new Turkish Penal Code (TPC), Law No. 5237, which entered into force in 2005, and the subsequent amendments made to its Article 191, Türkiye has undertaken a radical paradigm shift in its approach to drug users. Abandoning the largely punitive reflexes of the former TPC era, the lawmaker has removed imprisonment as a primary and automatic consequence for offenders who “possess drugs for personal use.” Instead, it has adopted “treatment and probation” as the default sanction. On a theoretical level, this regulation is a revolutionary step, shifting the Turkish legal perspective on the user from a punitive standpoint to a restorative and rehabilitative philosophy.

However, the reflection of philosophical changes enacted in legal texts into judicial practice—which possesses deep-rooted habits and an entrenched mindset—is not always a linear and seamless process. There is typically a significant time and adaptation period between a law’s enactment and the full internalization of its spirit by all layers of the system. This process becomes even more complex in regulations such as TPC Article 191, which grant judges new roles (such as case management) and wide discretionary powers (like imposing a direct sentence instead of treatment). Consequently, the potential tension between the legislator’s ideal of rehabilitative justice and the judicial practice’s capacity and established reflexes to adapt to this ideal emerges as a core problematic worthy of investigation.

This study aims to understand how this philosophical transformation, as reflected in the legal text, has found its reception in the practice of the High Court, what kinds of adaptation difficulties and mindset conflicts it has generated, and how the judicial mind has interpreted and internalized this new institution. In line with this primary objective, this paper will focus on the decisions of the Criminal General Assembly of the Court of Cassation (CGAC) to answer the central research question: “How has the judiciary undergone a cognitive trial in processing the rehabilitative philosophy introduced by TPC Article 191?” The study will not content itself with merely describing legal regulations; it aims to decipher the reasoning patterns, cognitive biases, newly developed profiles, and implicit assumptions reflected in the High Court’s decisions from a forensic psychological perspective.

Material and Methods

This study was designed according to the “document analysis” method, a qualitative research design that allows for the examination of texts and documents in social science and legal research. Document analysis aims to systematically review existing records and documents to identify specific themes, patterns, and meanings (Bowen, 2009). The primary rationale for selecting this design is the nature of the research problem: examining the adaptation process of the judicial mindset to a new legal philosophy introduced by TPC Art. 191 is best achieved through the analysis of primary and official documents, such as the decisions of the Court of Cassation. Through this design, the High Court’s logic of reasoning, its implicit assumptions, and its stance on the philosophical transformation have been deciphered from the texts it has produced.

The data set for this research consists of the decisions of the CGAC, which are publicly available on the official website of the Republic of Türkiye Court of Cassation (www.yargitay.gov.tr). The primary reason for selecting CGAC decisions is that this assembly is the final authority that resolves differences in case law among the chambers of the Court of Cassation and issues the highest-level precedential decisions. This characteristic provides an ideal ground for observing the evolution of the judicial mindset and the ultimate legal synthesis reached.

The data collection and sample selection process included the following steps:

1. The public case law search engine of the Court of Cassation was utilized.
2. To create the data pool, the phrase “possessing drugs for personal use,” which is the focal offense of the research, was used as a keyword.
3. The search yielded a total of 81 CGAC decisions ruled between 2005 and 2024. From this pool of 81 decisions, the “purposive sampling” method, frequently used in qualitative research, was employed to select the final analysis sample. Purposive sampling involves the deliberate selection of cases that are most relevant to the research purpose and contain the richest information for a detailed study (Patton, 2015). Accordingly, the following inclusion criteria, aligned with the focus of this study, were established: a) The decision must contain a discussion regarding the application, interpretation of, or hesitations about the treatment and probation measures stipulated under TPC Art. 191. b) It must provide data on how the judiciary interprets the new rehabilitative philosophy by making a “more favorable law” comparison between the old and new codes. c) It must discuss the limits and justifications of the judge’s “discretionary power” (e.g., the profile of the “incorrigible offender”). d) It must include an assessment of the interaction of TPC Art. 191 with other institutions of criminal law, such as the HAGB (hükmün açıklanmasının geri bırakılması, or the suspension of the pronouncement of the judgment).

Based on these criteria, 44 CGAC decisions deemed most suitable for the research purpose constituted the final analysis sample. In the analysis of this sample of 44 CGAC decisions, "thematic analysis," a qualitative data analysis technique, was used. Thematic analysis is a flexible method used to identify, analyze, and report significant themes and patterns within a data set (Braun & Clarke, 2006). The analysis was conducted with an "inductive approach," meaning that themes were derived directly from the data rather than imposing a pre-existing theory onto the data. The analysis process consisted of the following stages:

1. All decisions were read carefully multiple times to understand the essence of the case, the differences in opinion between the lower courts, the Chambers of the Court of Cassation, the CGAC, and the final outcome.
2. Each decision text was examined line-by-line, and expressions considered relevant to the transformation process of the judicial mindset (e.g., "considering the concrete fine as more favorable," "incorrigible personality," "has no discretionary power," "treatment is a right," "the decision does not have the nature of a final judgment," etc.) were marked, and brief codes were created for them.
3. The generated codes were grouped according to their relationships with one another. In this grouping process, themes, which are broader and more meaningful categories, were developed by abstracting the codes. For instance, codes such as "error in applying the more favorable law," "cognitive inertia," and "preference for a concrete sentence" formed the main theme of "Cognitive Resistance to the New Philosophy." Similarly, the codes "criminal record," "noncompliance with treatment," "unreformable personality," and "discretionary power" were consolidated under the main theme "The Limits of the Rehabilitative Philosophy."
4. The identified themes were reviewed again to test their consistency across the entire data set. In this final stage, the process explaining the transformation of the judicial mindset, presented in the "Findings" and "Discussion" sections, was finalized.

The scientific validity and reliability of this qualitative study were supported by several strategies. The validity of the study is based on the fact that the analyzed data set (CGAC decisions) is public, verifiable, and constitutes a primary source. This allows other researchers to access the same data and corroborate the findings. The reliability and objectivity of the study were ensured by the systematic and principled approach followed in the data analysis. The fact that the themes and the final model were derived inductively from the decision texts themselves, rather than from the researcher's personal assumptions, reinforces the data-driven nature of the analysis. The emphasis on recurring and consistent themes across different decisions demonstrates that the results are not coincidental but reflect an established reasoning pattern of the High Court.

Ethical Considerations

This research did not require ethics committee approval as it is based on the secondary analysis of official documents (court decisions) that are public and accessible to everyone, and no direct study was conducted with human participants. Throughout the study, the principles of scientific research and publication ethics were adhered to.

Results

This section thematically analyzes the reception of the new philosophy concerning drug users, introduced by Article 191 of the TPC No. 5237, within Turkish judicial practice. It explores the adaptational challenges encountered during this process and the resulting transformations in the judicial mindset, based on an examination of the decisions of the CGAC (Table 1).

The analyzed decisions clearly reveal that with TPC Art. 191, the legislator aimed for a radical paradigm shift concerning the drug user. As clearly defined in Case File 2, this shift is a transition from the punitive approach, which sees the user as an "offender," to a therapeutic/restorative approach that defines them as a "patient" or an "individual in need of help." This new philosophy emphasizes that the primary sanction is not imprisonment, but "treatment and probation" aimed at reintegrating the individual into society. This philosophical transformation also fundamentally alters the role of the judge. The judge is no longer expected to be merely a "legal technician" who identifies the crime and imposes a sentence, but also to write the most appropriate rehabilitation prescription by assessing the defendant's social and economic profile, level of addiction, and potential for treatment compliance. A practical reflection of this new role is seen in the situation analyzed in Case File 6. In this decision, it is understood that the law positions the judge as a "case manager" by granting the authority to choose between different sanction options (such as treatment only, or sentence with treatment) based on the defendant's profile (for instance, being young and a first-time offender versus having a history of resistance to treatment).

The reviewed decisions clearly show that the judicial system's adaptation to the new and abstract philosophy of TPC Art. 191, by breaking away from its entrenched and punitive habits, has been an arduous and time-consuming process. The greatest difficulty in grasping the new philosophy was experienced in determining the "more favorable law." It was found that courts could not fully comprehend the abstract and future-oriented major benefit of the new law, where a sentence might not be executed at all if treatment is complied with. The most striking example of this was observed in a children's court decision examined in Case File 3. In this decision, the court erroneously deemed a concrete "monetary fine" under the old law as more favorable than the treatment and probation measure of the new law. In the analysis of the decision, this preference was assessed as a typical reflection of a deep-rooted "cognitive inertia" and the primacy of concrete thinking over abstract thought. That this cognitive error was not exclusive to local courts was proven when a Criminal Chamber of the Court of

Table 1. Thematic analysis of the 44 analyzed criminal general assembly of the court of cassation decisions by year

File No.	Year of Decision	Subject of Dispute (Main Theme)	Prominent Forensic Psychology Concept / Judicial Principle	Direction of Final Verdict
44	2005	The timing of effective remorse ("before" vs. "after" official discovery)	Legal definition of the moment of "official discovery"; proactive vs. reactive remorse	Reversal (to correct the type of remorse applied)
41	2006	The requirement for effective remorse that the assisted crime be equivalent to or more severe than the perpetrator's own crime	"Principle of equivalence"; analysis of protected legal interest; cost-benefit analysis	Affirmation (denial of effective remorse)
42	2006	A TPC Art. 191/2 treatment decision not constituting a violation of a prior HAGB decision	The "user" label as a protective shield; the priority of the rehabilitation philosophy	Reversal (HAGB cannot be pronounced)
-43	2006	Inability to establish conviction based on the testimony of a single unreliable witness	Corroboration of the principles of "implicating another" and "in dubio pro reo"; analysis of corroborating evidence	Reversal (In favor of user status)
38	2011	The legal nature of possessing drugs upon being brought to prison under arrest	Context transforming intent (passive possession vs. active intent to bring in)	Reversal (classification as an attempt)
39	2011	The inadmissibility of using a preventive search warrant for a judicial search based on specific criminal suspicion	Unlawful evidence; distinction between preventive search vs. judicial search	Reversal (acquittal and incomplete investigation)
35	2012	Conviction based on a general "street dealer" profile assumption without concrete evidence	Prohibition of assumption-based profiling; defendant's denial cannot be interpreted against them	Reversal (in favor of user status)
36	2012	The prevalence of precision scales as evidence over the defendant's plausible defense	Precision scales as "decisive evidence"; synergy of evidence; a clean record does not grant absolute protection	Affirmation (trafficking offense)
37	2012	The requirement to prove each act of alleged serial sales individually in a case with multiple allegations	"Retail" analysis vs. "wholesale" approach; avoiding the cognitive contamination effect	Reversal (for severing the acts)
28	2013	The use of the defendant's own statement about his usage amount as evidence against him	Turning the defendant's statement into evidence against him; Analysis of digital traces	Affirmation (importation offense)
29	2013	The legal status of a synthetic drug not on the official list of banned substances at the time of the crime	Teleological and scientific legality vs. Formalistic legality; Interpreting the legislator's intent	Affirmation (in favor of conviction)
30	2013	The legal nature of a lower court's "resistance" decision against a reversal by the Court of Cassation	Doctrine of de facto compliance; Judicial hierarchy and the psychology of communication	Procedural reversal (case returned to the chamber)
31	2013	Evaluation of the defendant's mother's contradictory statements (initial report vs. court testimony)	Analysis of witness motivation ("moment of desperation" vs. "protective instinct")	Affirmation (trafficking offense)
32	2013	Determining the ownership of multiple drug packages found at a complex crime scene	"Evidence dissociation" technique; The power of a neutral witness's testimony	Affirmation (trafficking offense)
33	2013	The defendant's criminal profile (modus operandi) outweighing his cooperative behavior (voluntary surrender)	The power of a profile to interpret other evidence; Hierarchy of evidence	Affirmation (trafficking offense)
34	2013	A defendant, proven not to be a user by a report, being caught with cannabis plants and processed cannabis	Logical analysis ("why possess if you don't use?") vs. Formal analysis ("each crime is separate")	Reversal (in favor of user status)
26	2014	Weighing of conflicting evidence (packaging, quantity, fleeing, profile) for and against the defendant	Synergy of evidence and the power of holistic analysis; Difference in judicial philosophy	Affirmation (trafficking offense)

Note: CGAC = Criminal General Assembly of the Court of Cassation; HAGB = Suspension of the pronouncement of the judgment; TPC = Turkish Penal Code.

Table 1. Continued

File No.	Year of Decision	Subject of Dispute (Main Theme)	Prominent Forensic Psychology Concept / Judicial Principle	Direction of Final Verdict
27	2014	A search conducted without a prosecutor's order after criminal suspicion has been established	"Fruit of the poisonous tree" doctrine; The absolute threshold of legality before "intent reading"	Reversal (in favor of acquittal)
25	2016	The legal re-classification of a defendant's crime after violating probation that was granted based on a "user" status	The fragility of the "user" label; Acquired rights vs. material truth	Reversal (to reclassify as trafficking)
24	2017	The failure to concretely establish a moment of sale despite technical and physical surveillance	"Retail" analysis of the evidence chain; Legally invalid witness testimony (TPC Art. 148/4)	Reversal (in favor of user status)
19	2018	Whether to grant a new chance of treatment to a "user" defendant who previously failed to comply with it	The judge's discretionary power and the development of the "incurable defendant" profile	Affirmation (in favor of direct punishment)
20	2018	The philosophical debate on imposing direct prison sentences on defendants with a history of relapse and noncompliance	Rehabilitation idealism vs. judicial realism (risk analysis)	Affirmation (in favor of direct punishment)
21	2018	The evidentiary value of contradictory witness testimonies that were later recanted	Weighing the reliability of the first statement vs. the later statement; Conscientious conviction	Affirmation (in favor of conviction)
22	2018	A defendant, acquitted of a drug charge, being convicted for using someone else's identity at the start of the investigation	Formalistic interpretation vs. teleological interpretation; The primacy of intent at the time of the act	Affirmation (conviction under TPC Art. 268)
23	2018	The nature of the act of being caught with drugs at a prison entrance	Context defining intent; Active concealment vs. passive forgetfulness	Affirmation (trafficking Offense)
14	2019	The lack of direct evidence of sale despite strong circumstantial evidence (hidden stash, economic profile)	Inferential logic vs. the search for direct proof; Strong suspicion ≠ Conclusive proof	Reversal (in favor of user status)
15	2019	Whether a confession made at the moment of capture qualifies as "effective remorse"	Pragmatic vs. rule-based interpretation of the concept of "effective remorse"	Procedural reversal (merits not addressed)
16	2019	The scope of review for a prosecutor's objection to a court's "user" designation	The role of the prosecutor (the system's "trafficker radar"); The "second opinion" mechanism	Procedural reversal (regarding scope of objection)
17	2019	The failure to establish a physical link (no fingerprints) between the drugs and the defendants despite a detailed tip-off	Hierarchy of evidence (scientific proof > narrative coherence); Narrative completion bias	Reversal (in favor of user status)
18	2019	A statement of "I am a user" aimed at concealing a trafficking offense not constituting effective remorse	Deciphering a "strategic confession" and deceptive tactics; Intent-focused analysis of remorse	Affirmation (denial of effective remorse)
12	2020	Interpretation of a recanted witness testimony and the act of "growing one's own drugs"	A recanted testimony losing its evidentiary value; The principle of "Producer ≠ Trafficker"	Reversal (in favor of user status)
13	2020	A lower court's resistance by creating a "street runner" narrative to fill evidence gaps	Narrative reasoning vs. the search for concrete evidence	Reversal (in favor of user status)
10	2021	The failure to establish the elements of a "trafficking" offense despite a high quantity of drugs	The CGAC's three-pronged test (behavior, manner of possession, quantity)	Reversal (in favor of user status)

Note: CGAC = Criminal General Assembly of the Court of Cassation; HAGB = Suspension of the pronouncement of the judgment; TPC = Turkish Penal Code.

Table 1. Continued

File No.	Year of Decision	Subject of Dispute (Main Theme)	Prominent Forensic Psychology Concept / Judicial Principle	Direction of Final Verdict
11	2021	The legal nature of a treatment order under TPC Art. 191/2 and the proper appeals process (appeal vs. objection)	The legal status of the “user” (not a convict, but a “defendant in process”)	Reversal (to be reviewed via objection)
2	2022	The error of imposing a direct prison sentence on a “user” defendant when TPC Art. 191 should have been applied	The shift from punitive to therapeutic justice (Paradigm shift)	Reversal by extraordinary Procedure (in favor of treatment)
3	2022	The failure to recognize the new TPC as more lenient for a child defendant and the error of mixed application	Cognitive inertia; the prevalence of concrete thinking over abstract thinking	Reversal (to correct fundamental errors)
4	2022	The error of joining a drug case with another crime and the repetition of the “lenient law” mistake	The judicial isolation of the “user” profile; systemic cognitive resistance	Reversal (to correct errors)
5	2022	The evidence being deemed insufficient for a “trafficking” charge despite a tip-off and multiple packages	Hierarchy of evidence (abstract tip-off vs. lack of concrete evidence); the evidentiary value of cooperation	Reversal (in favor of user status)
6	2022	The unjustified use of discretionary power in choosing a sanction for a “user” defendant	The requirement of justification; the transparency of the judicial “black box”	Reversal (to provide justification)
7	2022	The evidentiary value of a confession that contradicts material facts and is later recanted	The reliability test for a confession; prohibition of character judgment; confirmation bias	Reversal (in favor of acquittal)
8	2022	Whether to confiscate the symbolic amount of proceeds obtained from the crime	The reflex to destroy the economic motive of a crime; distinction between punishment vs. security measure	Affirmation (in favor of confiscation)
9	2022	The reliability of an accomplice’s statement motivated by the hope of “effective remorse”	Analysis of witness/accuser motivation; skepticism toward “implicating another”	Reversal (in favor of acquittal)
1	2023	The validity of evidence obtained as a result of an unlawful search	Procedural justice vs. consequentialism; confirmation bias (from the defendant’s profile)	Affirmation (in favor of conviction)

Note: CGAC = Criminal General Assembly of the Court of Cassation; HAGB = Suspension of the pronouncement of the judgment; TPC = Turkish Penal Code.

Cassation repeated the same mistake, as seen in Case File 4. This situation is a symptom of how slowly and difficultly the new philosophy was understood, even at the highest echelons of the judiciary.

The failure to fully comprehend the legal nature of the new institution led to significant confusion and procedural debates within the system. As discussed in detail in Case File 11 and Case File 16, whether the “treatment and probation” decision issued under TPC Art. 191/2 was a final “judgment” ending the case or an “interim ruling” suspending the proceedings was long debated. The uncertainty over whether to resort to “cassation appeal” or “objection” against these decisions is an indicator of the “adaptation pains” the system experienced in fitting this new, hybrid model into existing procedural molds. Indeed, the CGAC concluded this debate in its final decisions

in Case File 11 and Case File 16, ruling that these decisions have the nature of a “suspension order” and are subject to the legal remedy of “objection.”

While the judicial system has embraced the rehabilitation philosophy over time, it has also developed a body of case law demonstrating that this philosophy is not an unlimited right and that the system’s punitive reflexes are reactivated, especially in the face of offenders who “persist in committing crimes.” This approach is most clearly seen in Case File 19 and Case File 20, where the CGAC upheld lower court decisions that cited the defendant’s past noncompliance and criminal records. In these decisions, the CGAC emphasized that the amendment by Law No. 5560 grants the judge “discretionary power” and that the court is not an “automaton.” It was accepted that the judge could evaluate the defendant as

a whole, with their past, criminal record, and behavioral patterns. As a result of this holistic evaluation, the courts' bypassing of the treatment option and imposing direct prison sentences with characterizations like "incorrigible personality" or "unreformable" was seen as a legal and sufficiently justified use of the judge's discretionary power. These decisions prove that rehabilitation is viewed not as an unconditional right, but as an "opportunity" that can be revoked if abused.

It was determined that the diagnosis of a "user" and the subsequent decisions under TPC Art. 191 create a "ripple effect" that influences not only the specific case but also other institutions of the criminal justice system. The most concrete example of this is the interaction between the institution of Suspension of the Pronouncement of the Judgment (HAGB), examined in Case File 42, and a decision under TPC Art. 191/2. In Case File 42, the CGAC ruled that a treatment order issued under TPC Art. 191/2 is not a finalized "conviction judgment" in the sense of the Code of Criminal Procedure (CMK), but rather, by its legal nature, a "suspension order." As a direct consequence of this interpretation, it was accepted that a defendant who receives a treatment order during their HAGB probation period has not yet fulfilled the condition of "committing a new intentional crime" required to revoke the HAGB. Thus, the treatment decision effectively served as a "protective shield" for the defendant, preventing the execution of a sentence for another crime. This situation shows that the "user" label grants the defendant a special legal status and privilege not possessed by other offenders.

Discussion

The normative reform introduced by Article 191 of TPC aimed not only at a paradigm shift in criminal policy towards drug users but also at a comprehensive transformation of the operational mechanisms of the Turkish criminal justice system, the judicial role, intra-systemic institutional relations, and even judicial philosophy. The findings of this study reveal that although TPC Art. 191 aims for a rehabilitation-centered criminal policy on a normative level, its implementation in practice presents a fragmented and resistant landscape that does not fully align with this philosophy. The discussion will be conducted on three levels in this context: (1) the philosophical and psychosocial foundations of judicial decision-making processes, (2) the professional formation and institutional limitations of the implementing actors, and (3) the systemic and unpredictable ripple effects of the reform.

The Transformative Phases of the Judicial Mindset: A Chronological Analysis of the Decisions

The 44 analyzed CGAC decisions, spanning a period of approximately 18 years from 2005 to 2023, offer the opportunity to examine the trajectory of the rehabilitation philosophy introduced by TPC Art. 191 in judicial practice through three main phases:

Phase 1 (2005–2011): Establishment, Confusion, and the Determination of Foundational Principles

This period covers the immediate aftermath of the legal reform and is the phase in which the judicial system first confronted the new philosophy, thus experiencing the most "confusion" and the greatest effort to "establish principles." The decisions from this period focused on creating the very alphabet of a new legal language. Foundational and constituent interpretations—such as the definition of the critical moment of "official discovery" in effective remorse in File 44 (2005), the "principle of equivalence" to prevent the abuse of this remorse in File 41 (2006), and the "protective shield" status of a TPC Art. 191 decision against a HAGB in File 42 (2006)—were made during this time. Procedural and jurisdictional struggles, such as drawing the sharp line between a "preventive search" and a "judicial search" in File 39 (2011), also reflect the growing pains of this era. In this phase, the judicial mindset is in a "learning" process, trying to understand, define, and integrate the new philosophy into the existing system while grappling with both philosophical and technical difficulties.

Phase 2 (2012–2018): The Development of Doctrines and the Drawing of Boundaries

This is a "maturation" phase where the foundational principles have settled, and the CGAC began to develop new doctrines through more complex cases, thereby drawing the boundaries of the rehabilitation philosophy. The most definitive development of this period is the transformation of judicial risk analysis into a doctrine. The decisions in File 19 (2018) and File 20 (2018) established that a judge could use their "discretionary power" to impose a direct prison sentence on defendants who had repeatedly rejected treatment opportunities. This marks a turning point where the idealism of rehabilitation was balanced with judicial realism and public order concerns. Similarly, the decision in File 25 (2016), which stated that a defendant's "user" label could be revoked for violating probation, is a pragmatic defense mechanism developed by the system. In this phase, the judicial mindset is no longer merely interpreting the law but is in an active "shaping" role, producing new profiles ("incorrigible defendant") and doctrines ("fragile label") according to the needs of practice.

Phase 3 (2019–2023): The Application of Established Precedents to Complex Cases

This most recent phase is a period of "mastery," in which the CGAC has largely established its core doctrines and meticulously applies these established principles to cases with extremely complex and ambiguous evidentiary structures. The fact that recent decisions such as File 2, 3, and 4 (2022) are still correcting lower court errors on the most fundamental issues (paradigm shift, lenient law error) shows that the

“pedagogical” role of the CGAC continues. In this period, decisions like File 9 (2022) and File 7 (2022) demonstrate how sophisticated the analysis of evidence has become, with in-depth logical and psychological analyses replacing simple formulas. The CGAC’s explicit articulation of its own three-pronged test in File 10 (2021) proves that a certain level of consistency and predictability has now been achieved.

This historical evolution in the judicial mindset can be examined in more depth under the following thematic headings.

Practice Caught between Legal Formalism and Judicial Pragmatism

The persistent errors in determining the “most favorable law” and the tendencies to lean towards punishment instead of rehabilitation in the application of TPC Art. 191 should be evaluated not merely as technical application problems, but as symptoms of a deep philosophical division regarding the fundamental orientation of the judiciary. While legal formalism accepts the law as a predictable, fixed set of rules, judicial pragmatism prioritizes the legislator’s purpose, the social consequences, and the function of the normative regulation (Dülger, 2017; Dworkin, 1988). Particularly in the examined case examples, the preference of some judges for a more familiar and measurable sanction like a “monetary fine” over an abstract “treatment benefit” can be seen as an expression of a search for formalist security. This reflex, while offering “legal certainty” to the individual, carries the risk of disregarding the dynamic and purposive spirit of the law (D’Amato, 2010).

At this point, the normative guiding role played by the CGAC points to the pedagogical capacity of high courts in the context of common law. The practice of producing “instructive precedents” to break the resistant attitudes of lower courts and even some of its own chambers demonstrates the central role of high courts in the evolutionary nature of law (Segal & Spaeth, 2005; Türkölmez, 2019). In this context, it is observed that the high court attempts to resolve the philosophical conflict in the system not only with technical precedents but also with a value-oriented “attitudinal model” approach (Segal & Spaeth, 2002).

The Evolving Judicial Role and the Challenge of Practitioner Preparedness

The implementation of TPC Art. 191 has precipitated a paradigm shift in the judicial function. The judge is no longer merely a “norm technician”—an impassive arbiter who identifies a crime and applies a predetermined penalty. Instead, they are thrust into the complex roles of a “social engineer” and a “case manager,” tasked with the sophisticated evaluation of extra-legal variables such as the defendant’s socioeconomic history, the severity of their addiction, and their prognostic capacity for rehabilitation. This transformation fundamentally challenges the classical Weberian ideal of the judge as a detached automaton, repositioning them as an active, engaged decision-making subject who must interpret and act upon a rich psychosocial context (Barry, 2023; Weber, 1978).

However, this radical redefinition of the judicial role has not been met with a corresponding evolution in professional training. A review of the pre-service curriculum at the Justice Academy of Türkiye reveals a conspicuous absence of essential competencies such as addiction psychology, clinical risk assessment, comparative treatment modalities, and multidisciplinary case management (Justice Academy of Türkiye, n.d.). This gap imposes a substantial cognitive and professional burden on practitioners. Consequently, judicial decisions regarding referral to treatment are often predicated not on validated assessment tools but on discretionary judgments rooted in subjective intuition and incomplete data (Bystranowski et al., 2022). This strongly suggests that the professional socialization of judges has failed to integrate the necessary psychosocial skills. Therefore, for the reform’s rehabilitative philosophy to truly penetrate everyday judicial practice, a structural reorientation of the judicial mindset is imperative, supported by a robust and sustained investment in institutional capacity-building (Friedman, 2019).

Actuarial Justice, Risk Assessment, and the Specter of Offender-Based Punishment

A notable trend in the appellate case law is the justification for denying rehabilitation based on a defendant’s prior criminal record or history of noncompliance with treatment. This signals a judiciary that is increasingly adopting a “risk management” perspective. This approach aligns seamlessly with the principles of “actuarial justice,” a dominant paradigm in modern criminology that focuses on managing and classifying populations based on calculated future risk, thereby structuring the penal system around goals of prediction and administrative efficiency rather than individualized justice (Feeley & Simon, 1992).

Within this framework, the judicial gaze shifts from the committed act itself to the perceived “risky” character of the person who committed it. This represents a perilous slide away from the bedrock principle of “act-based criminal liability” (*Tatstrafrecht*), where punishment is tied to the specific offense, towards “offender-based criminal liability” (*Täterstrafrecht*), where the sanction is tailored to the identity, history, and perceived future dangerousness of the individual (Tezcan et al., 2024). A critical future challenge will be to establish objective, transparent, and contestable criteria for these risk assessments to safeguard against arbitrary and discriminatory outcomes.

In this light, the ethical guidelines from the Council of Europe (2024) on the use of AI in judicial systems offer a crucial warning: algorithmic decision-support systems, with their allure of objectivity, must be strictly confined to an advisory role, ensuring that the human judge remains the ultimate arbiter of the decision (Javed & Li, 2024). The nascent efforts in Türkiye, supported by TÜBİTAK, to develop domestic risk assessment algorithms must therefore be scrutinized with extreme care as this global trend takes local form (The Scientific and Technological Research Council of Türkiye, 2024).

The Material Constraints: Infrastructure, Geography, and Social Perception

The practical viability of TPC Art. 191 is contingent not only on judicial will but also on material and social realities. The existing institutional infrastructure for rehabilitation presents a major obstacle. Current data reveal a stark geographical disparity, with specialized treatment centers like AMATEM and YEDAM (AMATEM is a centre that provides outpatient and inpatient treatment services for individuals aged 18 and over who have alcohol or substance use disorders. YEDAM is a centre that provides free psychological and social support to individuals experiencing problems related to tobacco, alcohol, substance abuse, internet, and gambling.) heavily concentrated in major metropolitan areas, leaving rural and less-developed regions critically underserved (Republic of Türkiye Ministry of Health, n.d.; YEDAM, n.d.). This logistical bottleneck creates a *de facto* inequality of access, where a judge's decision may be constrained not by legal principle but by the simple non-availability of a treatment facility, causing the system to default to punitive outcomes.

Compounding this structural deficit is the powerful influence of social perception. A pervasive public and media narrative, which frames probationary and alternative measures as a form of "impunity" for criminals (General Directorate of Prisons and Detention Houses, 2025), exerts considerable informal pressure on judicial actors. This climate of public opinion can sway judges towards more traditional, punitive decisions to avoid public criticism. The indirect but potent effect of this social pressure is the erosion of the reform's legitimacy. This underscores the necessity of a proactive, concerted strategy to ensure the judiciary is not left isolated. This requires strategic public communication and educational campaigns designed to build societal understanding and cultivate trust in rehabilitative justice.

Systemic Reverberations and the Autopoietic Nature of Law

The influence of TPC Art. 191 has extended far beyond its immediate target of drug offense litigation, creating systemic ripple effects throughout the entire body of criminal law. A prime example is its interaction with the institution of the Suspension of the Pronouncement of the Judgment (HAGB). The legal stipulation that a treatment order under Art. 191/2 does not constitute a formal "conviction" and created a novel legal status, which in turn directly impacted the applicability and interpretation of HAGB. This phenomenon perfectly illustrates the principles of Luhmann's systems theory, which posits law not as a static hierarchy of rules but as a dynamic, self-referential system that constantly produces and reproduces its own elements through internal operations (Luhmann, 2004).

As conceptualized by Teubner (1993) in his theory of "autopoietic law," legal interventions rarely produce clean, isolated outcomes. Instead, they create unforeseen "structural couplings" and "systemic reverberations"—or "spillover

effects"—across the entire legal field. The experience with TPC Art. 191 serves as a powerful case study in this regard. It demonstrates the imperative for future legislative design to move beyond mere legal-doctrinal coherence and to integrate sophisticated methodologies such as systems analysis, predictive modeling, and genuinely multidisciplinary perspectives to better anticipate and navigate the complex, emergent behavior of the legal system (Elrick, 2020).

Limitations and Suggestions for Future Research

Like any scientific study, the results and generalizability of this research have certain limitations stemming from the nature of the method and data set used. The first and most significant limitation is that the study is a document analysis based on the public, written decision texts of the CGAC. While this method is exceptionally powerful for deciphering the formal and justified reasoning of the High Court, it may not fully reveal all the implicit assumptions, personal conceptions of justice, or systemic pressures present at the moment of the judge's final decision. In addition, the fact that the sample consists of CGAC decisions means that the findings are based on cases that are legally the most controversial and exceptional. Therefore, while the conclusions reached in this study indicate the principled orientations at the "pinnacle" of the system, they do not claim to fully reflect the everyday and routine judicial practice in first-instance courts. Finally, as the research primarily focuses on the evolution of the "judicial mindset," the influence of other actors in the criminal justice system, such as prosecutors, lawyers, and law enforcement, was excluded from the scope.

The methodological and focal limitations of this study also provide a fertile ground for future research in the field. Accordingly, to complement this text-based analysis, field research involving interviews with first-instance and appellate court judges and prosecutors could reveal the unwritten dynamics of "law in action" and how practitioners perceive the new legal philosophy. Similarly, to balance the exceptional nature of CGAC decisions, quantitative analyses conducted on a large sample of case files from first-instance courts could statistically demonstrate the application rates of TPC Art. 191 and how these rates vary according to different variables. To complement the "top-down" perspective of this study with a "bottom-up" one, experience-focused qualitative studies with individuals who have been subjected to treatment and probation under TPC Art. 191 would provide invaluable data for understanding the system's success and how the rehabilitation process is perceived by the offenders themselves.

Author contributions

Conception and design: N.H.; Data acquisition: N.H.; Data analysis: N.H.; Data interpretation: N.H.; Drafting of the manuscript: N.H.; Critical revision of the manuscript: N.H. The author reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

Ethics committee approval and informed consent were not required for this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The author declares that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The author declares that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Barry, B. M. (2023). Judging better together: Understanding the psychology of group decision-making on panel courts and tribunals. *International Journal for Court Administration*, 14(1), 6. [Crossref]
- Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal*, 9(2), 27-40. [Crossref]
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77-101. [Crossref]
- Bystranowski, P., Janik, B., Próchnicki, M., Hannikainen, I. R., Da Franca Couto Fernandes De Almeida, G., & Struchiner, N. (2022). Do formalist judges abide by their abstract principles? A two-country study in adjudication. *International Journal for the Semiotics of Law - Revue Internationale de Sémiotique Juridique*, 35(5), 1903-1935. [Crossref]
- D'Amato, A. (2010). *The injustice of dynamic statutory interpretation* (Faculty Working Papers, No. 87). Northwestern University School of Law. <http://scholarlycommons.law.northwestern.edu/facultyworkingpapers/87>
- Dülger, M. (2017, May 17). *Legal pragmatism: The philosophy of pragmatic legal reasoning and Richard Posner*. Paper presented at the 8th Symposium on Philosophical and Sociological Perspectives on Law.
- Dworkin, R. (1988). *Law's empire*. Harvard University Press.
- Elrick, L. E. (2020). The ecosystem concept: A holistic approach to privacy protection. *International Review of Law, Computers and Technology*, 35(1), 24-45. [Crossref]
- Feeley, M. M., & Simon, J. (1992). The new penology: Notes on the emerging strategy of corrections and its implications. *Criminology*, 30(4), 449-474. [Crossref]
- Friedman, L. M. (2019). *A history of American law* (4th ed). Oxford University Press. [Crossref]
- General Directorate of Prisons and Detention Houses. (2025). Genel Müdür Yıldırım'ın moderatörlüğünde 'Medyada Denetimli Serbestlik Algısı' paneli. <https://cte.adalet.gov.tr/Home/SayfaDetay/genel-mudur-yildirim-in-moderatorlugunde-medyada-denetimli-serbestlik-algisi-paneli22042025013148>
- Javed, K., & Li, J. (2024). Artificial intelligence in judicial adjudication: Semantic biasness classification and identification in legal judgement (SBCILJ). *Heliyon*, 10(9), e30184. [Crossref]
- Justice Academy of Türkiye. (n.d.). *Pre-service Training Curriculum*. <https://www.taa.gov.tr>
- Luhmann, N. (2004). *Law as a social system: Oxford socio-legal studies*. Oxford University Press.
- Patton, M. Q. (2015). *Qualitative research & evaluation methods: Integrating theory and practice* (4th ed). SAGE Publications.
- Republic of Türkiye Ministry of Health. (n.d.). *AMATEM and CEMATEM projects*. <https://sygm.saglik.gov.tr/TR,32548/amatem-ve-cematem-projeleri.html>
- The Scientific and Technological Research Council of Türkiye [TÜBİTAK] (2024, January 22). *2024-2025 R&D and innovation priority topics* (version 22.01.2024). <https://tubitak.gov.tr/tr/kurumsal/icerik-politikalar>
- Segal, J. A., & Spaeth, H. J. (2002). *Models of decision making: The attitudinal and rational choice models*. Cambridge University Press.
- Segal, J. A., & Spaeth, H. J. (2005). *The Supreme Court and the attitudinal model revisited*. Cambridge University Press.
- Teubner, G. (1993). *Law as an autopoietic system. (European University Institute Series)*. Blackwell Publishing. <https://hdl.handle.net/1814/23894>
- Tezcan, D., Erdem, M. R., & Önok, R. M. (2024). *Theoretical and practical criminal law - Special provisions* (22nd ed). Seçkin Publishing.
- Türkölmez, İ. R. (2019). The Supreme Court and the attitudinal model revisited. *Hacettepe Law Review*, 9(1), 276-281.
- Weber, M. (1978). Value-judgments in social science. In W. G. Runciman (Ed.), *Max Weber: Selections in translation* (E. Matthews, Trans., pp. 69-98). Cambridge University Press.
- YEDAM. (n.d.). *Green Crescent Counseling Center (YEDAM)*. <https://www.yedam.org.tr/>

Interrelationships among gambling-related cognitions, gambling severity, depression severity, and treatment motivation in individuals with gambling disorder

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Abstract

This study aims to identify the factors influencing treatment motivation in individuals with gambling disorder, assess the presence of co-occurring depression, and examine cognitive distortions related to gambling to inform targeted treatment strategies. The study included 60 patients who sought help for gambling-related issues. Participants were assessed for depression severity, gambling-related cognitive distortions, and treatment motivation. Additionally, information regarding their gambling history was obtained from both themselves and their relatives. The results indicated that higher depression severity was positively associated with greater gambling problem severity and an increased inability to control gambling behavior. Conversely, depression severity was negatively associated with confidence in treatment. Furthermore, gambling problem severity showed positive associations with heightened gambling-related expectations, interpretative biases, and extrinsic treatment motivation. These findings suggest that depression severity, cognitive distortions related to gambling, and treatment motivation play a significant role in gambling disorder. Consequently, these factors should be carefully assessed in individuals seeking treatment to develop effective intervention strategies.

Keywords: cognition, depression, distortion, gambling disorder, motivation

Main points

- A positive relationship was found between the severity of depression and the severity of gambling, as well as the cognition of not being able to stop gambling.
- A negative relationship was found between depression severity and treatment confidence and motivation.
- A positive relationship was found between gambling severity and gambling expectations, cognitive interpretive bias, and extrinsic motivation.
- In the treatment of gambling disorder, the severity of depression, gambling-related thoughts, and treatment motivation are important, and these variables should be carefully questioned by the clinician.

Introduction

Gambling disorder is characterized by persistent and recurrent gambling behavior that leads to significant impairment in personal, social, or occupational functioning. While its annual prevalence in the general population is estimated at

0.2% to 0.3%, lifetime prevalence ranges between 0.4% and 1% (American Psychiatric Association, 2013). Beyond its prevalence, gambling disorder is associated with substantial psychological, social, and financial burdens, making it a significant public health concern (Calado & Griffiths, 2016).

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A growing body of research highlights the role of cognitive distortions in the onset and persistence of gambling behavior. Distorted beliefs such as the illusion of control, gambler's fallacy, and recall bias contribute to individuals overestimating their ability to influence gambling outcomes, despite the inherent randomness of these activities (Oei & Gordon, 2008). Studies indicate that individuals with severe gambling problems tend to have stronger gambling-related cognitive distortions, which further reinforce maladaptive behaviors (Leonard et al., 2021; Myrseth et al., 2010). Cognitive-behavioral interventions targeting these distortions have been shown to effectively reduce gambling frequency, financial losses, and gambling-related urges (Fortune & Goodie, 2012; Ledgerwood et al., 2020). Variables such as gambling expenditure, past gambling duration, and gambling preferences have been shown to be associated with gambling cognitions and the severity of gambling (Boffo et al., 2017; Castrén et al., 2017; Nicholson et al., 2016). In particular, it has been demonstrated that individuals with a longer history of gambling tend to have more entrenched gambling cognitions and lower motivation to seek treatment. Therefore, gambling participation variables were also examined in this study. Previous research has demonstrated that individuals who prefer strategic games tend to exhibit higher cognitive distortions such as the illusion of control, whereas those who prefer non-strategic games are more likely to display impulsive behaviors and report higher gambling severity (Mallorquí-Bagué et al., 2018). This distinction is crucial as different gambling types may reflect distinct psychological characteristics, influencing both gambling behavior and treatment motivation.

Depression constitutes a significant comorbid condition frequently observed among individuals diagnosed with gambling disorder. Empirical evidence indicates a bidirectional relationship between depressive symptoms and gambling behavior, whereby gambling-related financial hardships, interpersonal conflicts, and emotional distress contribute to the onset or exacerbation of depression. Conversely, individuals experiencing depressive symptoms may turn to gambling as a maladaptive coping mechanism, seeking relief through escapism or self-medication (Buckholtz & Meyer-Lindenberg, 2012; Dowling et al., 2015). Importantly, depressive symptomatology has been associated not only with increased gambling severity but also with the presence of gambling-related cognitive distortions (Schluter et al., 2019). Furthermore, research suggests that cognitive distortions may mediate the relationship between depression and gambling severity, underscoring the complex and interrelated nature of these psychological constructs (Schluter et al., 2019).

Motivation for treatment is a crucial factor in the prognosis of individuals with gambling disorder, influencing treatment engagement, adherence, and outcomes (Hodgins et al., 2011). Individuals with severe depressive symptoms may demonstrate a greater readiness to seek treatment but are also at higher risk of early dropout due to feelings of hopelessness, low self-efficacy, and reduced motivation to sustain behavioral change (Gomes & Pascual-Leone, 2009; Karyotaki et al., 2015).

Although cognitive distortions are believed to affect both the development of gambling disorder and treatment motivation, this relationship has received limited empirical attention.

In line with the objectives of the present study, several hypotheses were formulated to examine the relationships among key psychological variables associated with gambling disorder. First, it was hypothesized that there would be a statistically significant relationship between depression severity and gambling severity, reflecting the potential interplay between affective symptoms and maladaptive behaviors. Additionally, the study proposed a significant association between depression severity and treatment motivation, including specific dimensions such as confidence in treatment. In light of previous research highlighting the role of cognitive distortions in the maintenance of gambling behavior, it was hypothesized that gambling-related cognitive distortions—such as gambling expectancies, interpretative bias, and illusion of control—would be significantly associated with gambling severity. Furthermore, the study aimed to explore the potential link between cognitive distortions and treatment motivation, given their possible impact on individuals' engagement with recovery. Finally, it was hypothesized that gambling participation variables, including the duration of gambling behavior and weekly gambling expenditures, would be significantly related to both gambling severity and gambling-related cognitions.

Although previous studies have separately examined the impact of cognitive distortions and depressive symptoms on gambling behavior, limited research has explored how these factors jointly influence treatment motivation in individuals with gambling disorder. Moreover, most existing studies focus on prevalence or severity, rather than psychological mechanisms affecting engagement in treatment. To address this gap, the present study aims to investigate the interrelationships among gambling-related cognitive distortions, depression severity, and treatment motivation in individuals diagnosed with gambling disorder. By identifying key psychological factors that influence readiness for treatment, this study seeks to contribute to the literature by offering a more integrated understanding of how cognitive and emotional variables may shape motivation for treatment. This, in turn, may inform the development of more targeted and effective therapeutic interventions for this population.

Material and Methods

This study was conducted using a cross-sectional, correlational research design aimed at examining the interrelationships among gambling-related cognitions, gambling severity, depression severity, and treatment motivation in individuals diagnosed with gambling disorder (GD). All participants were recruited from a university hospital psychiatry department. Participants were included in the study following a face-to-face structured clinical interview conducted by a trained clinician using the Structured Clinical Interview for DSM-5 (SCID-5-CV). This interview served to confirm the diagnosis of

GD and to evaluate psychiatric comorbidities. The SCID-5-CV process also functioned as the primary method of participant engagement and ensured that inclusion and exclusion criteria were rigorously applied. All clinical assessments and data collection were conducted in person, following ethical approval and informed consent.

Settings & Design

The study was approved by the ethics committee of Ege University (protocol number of ethics committee: 2021/34 Date: 2021). Sixty volunteer patients who presented to the psychiatry department of a university hospital were included in the study after providing written informed consent. Inclusion criteria were age between 18 and 65, self-reported or relative-reported gambling problems, willingness to participate after being informed about the study, and sufficient literacy to complete self-report measures. Exclusion criteria included being under 18 or over 65 and having a diagnosis of psychotic disorder, acute mania, dementia, intellectual disability, organic mental disorder, or severe neurological/medical conditions affecting cognitive functioning.

Measures

Case Report Form

A sociodemographic data form developed by the researcher was used to collect information on participants' age, gender, marital status, education, employment, medical and psychiatric history, and family history of psychiatric disorders, gambling, and substance use. The form also assessed participants' gambling behavior (e.g., frequency, amount spent), their intentions to quit, and the impact of gambling on their relationships, work, finances, and emotional well-being. Scores from other assessment tools were recorded in the case report form.

Structured Clinical Interview for DSM-5 (The Diagnostic and Statistical Manual of Mental Disorders-5)

The Structured Clinical Interview for DSM-5 Disorders - Clinician Version (SCID-5/CV) is a semi-structured diagnostic tool developed to facilitate the assessment of mental disorders in accordance with DSM-5 diagnostic criteria. Covering a wide range of psychiatric disorders, the SCID-5/CV has demonstrated high internal consistency across various studies. In the original study, Cronbach's alpha coefficients were generally reported to be above 0.80, indicating good reliability of the instrument (First et al., 2015). In the Turkish adaptation study, Elbir et al. (2019) reported Cronbach's alpha values ranged between 0.85 and 0.95, and interrater agreement (kappa) coefficients ranged between 0.65 and 1.00, supporting the instrument's high reliability (Elbir et al., 2019). In the present study, the SCID-5/CV was used to confirm GD diagnoses and to identify psychiatric comorbidities among participants.

South Oaks Gambling Screening Test Turkish Form

The South Oaks Gambling Screen (SOGS), developed by Lesieur and Blume (1987), is a widely used instrument designed to assess the severity of gambling behavior (Lesieur & Blume, 1987). The original scale consists of 20 items, and individuals scoring five or more points are classified as probable pathological gamblers. In the original study, the internal consistency coefficient of the scale was reported as Cronbach's alpha = 0.97, indicating excellent reliability. The Turkish validity and reliability study of the scale was conducted by Duvarcı and Varan (2001). In this study, the internal consistency coefficient of the Turkish version was found to be Cronbach's alpha = 0.8772 (Duvarcı & Varan, 2001). Additionally, it was suggested that a cut-off score of eight or higher would be more appropriate for classifying individuals as probable cases of gambling disorder in the Turkish context. These findings indicate that both the original and Turkish versions of the SOGS are reliable and valid tools for assessing the severity of gambling behavior.

Gambling-Related Cognition Scale

The Gambling-Related Cognitions Scale (GRCS), developed by Raylu and Oei (2004), assesses cognitive distortions related to gambling behavior. The scale includes five subscales: illusion of control, which refers to the false belief that one can control gambling outcomes through strategies or rituals; predictive control, which refers to the belief that one can predict gambling outcomes based on previous results; gambling expectancies, which reflect exaggerated expectations of positive outcomes from gambling; inability to stop gambling, which measures a perceived lack of control over gambling behavior; and interpretative bias, which refers to the tendency to attribute wins to personal skill and losses to external factors. Each subscale reflects different cognitive distortions that are known to increase gambling severity and maintain gambling behavior. It is a 7-point Likert-type scale comprising 23 items. In the original study, the internal consistency of the total scale was reported as Cronbach's alpha = 0.93, with subscale values ranging between 0.77 and 0.91, indicating high reliability. The Turkish validity and reliability study was conducted by Arcan and Karanci (2015), where the internal consistency coefficient for the total scale was found to be 0.84, and subscale values ranged between 0.52 and 0.78. These findings confirm that both the original and Turkish versions of the GRCS are valid and reliable tools for assessing gambling-related cognitive distortions.

Hamilton Depression Rating Scale

The Hamilton Depression Rating Scale (HAM-D-17) developed by Hamilton (1960) is an interview-based scale designed to systematically record observations related to depressive symptoms (Hamilton, 1960). The scale evaluates 17 items on a 5-point Likert-type scale, covering areas such as guilt, suicide, anxiety, sleep, and appetite. The highest possible total score is 53, with higher scores indicating greater severity.

of depressive symptoms. In the original study, the internal consistency of the scale was reported as Cronbach's alpha = 0.75. The Turkish validity and reliability study conducted by Akdemir et al. (2001) reported a similar internal consistency coefficient of Cronbach's alpha = 0.75, with a test-retest reliability coefficient of $r = 0.85$ and interrater reliability coefficients ranging from 0.87 to 0.98, confirming the scale's strong psychometric properties (Akdemir et al. 2001). These findings demonstrate that both the original and Turkish versions of the HAM-D-17 are valid and reliable tools for assessing depression severity.

Treatment Motivation Questionnaire

The Treatment Motivation Questionnaire (TMQ), developed by Ryan et al. (1995), is a 26-item scale designed to assess individuals' motivation for engaging in treatment. The scale follows a 5-point Likert format ranging from Strongly Agree to Strongly Disagree. In the original study, the internal consistency of the total scale was reported as Cronbach's alpha = 0.91, indicating excellent reliability (Ryan et al., 1995). The Turkish validity and reliability study conducted by Evren et al. (2006) identified four factors: internal motivation, external motivation, help seeking, and confidence in treatment. In this adaptation study, the internal consistency coefficients were reported as 0.91 for internal motivation, 0.42 for external motivation, 0.83 for help seeking, and 0.72 for confidence in treatment, with the total scale achieving a Cronbach's alpha of 0.84 (Evren et al., 2006). These results demonstrate that both the original and Turkish versions of the TMQ are valid and reliable tools for assessing treatment motivation.

Statistical Analysis

The research data were evaluated using SPSS v25.0 (IBM SPSS Corp.; Armonk, NY, USA). The suitability of numerical variables for normal distribution was examined with the Shapiro-Wilk ($n = 50$) test. Numerical variables are given as mean, standard deviation, and median (min-max). Descriptive statistics, including the mean, standard deviation, median, and range, were calculated for all clinical scale scores. These statistics provided a general profile of the participants' levels of depressive symptoms, gambling severity, gambling-related cognitions, and treatment motivation, and served as the basis for the subsequent correlation and group comparison analyses. Comparison of two groups in terms of numerical variables was made with the independent two-sample t -test if normal distribution was achieved, and with the Mann-Whitney U test if non-normal distribution was observed. For comparisons of more than two groups in terms of numerical variables, one-way ANOVA was used when normal distribution was achieved, and Kruskal-Wallis test was used when there was a non-normal distribution. In case of significance, pairwise comparisons after the ANOVA test were made with the Tukey test, and pairwise comparisons after Kruskal-Wallis were made with Dunn test with Bonferroni correction. Categorical variables are given as numbers and percentages. The relationship between scale scores was examined with Spearman correlation analysis. Cluster analysis was conducted to identify distinct

subgroups within the sample based on sociodemographic and clinical characteristics, gambling participation variables, and treatment motivation scores. Clusters were identified empirically using the two-step cluster component analysis method. Age of gambling onset, duration of gambling (years), weekly gambling activities (money invested, average hours spent, weekly frequency), gaming preferences (strategic/non-strategic), clinical characteristics (psychiatric comorbidity, severity of depression, alcohol/substance use, suicide history), sociodemographic characteristics (marital status, educational status, employment status), and treatment motivation scores (TMQ total score and subscale scores) were included in the analysis as markers. The presence of psychiatric comorbidity, substance use, preferred game type (strategic/non-strategic), and TMQ total scores were found to be the most important indicators. Comparison between empirical sets derived for the study variables (sociodemographic, clinical, and treatment motivation measures) was performed using χ^2 tests for categorical factors and analysis of variance for quantitative measures. The significance level was accepted as 0.05 for all hypotheses.

Results

The study sample consisted entirely of male participants with a mean age of 35.6 years (standard deviation [SD] = 8.1). Regarding marital status, the majority were either married or single, with a smaller portion being divorced. Most participants had completed university education and were employed at the time of the study. Monthly income levels varied, with a significant proportion earning above 3000 TRY. While the majority of participants reported no history of substance use, a considerable proportion reported current alcohol (73.30%) and tobacco use (73.30%). The frequency of smoking and alcohol consumption varied across the sample. Additionally, 21.70% of participants reported having a physical illness, and 50% reported a family history of psychiatric disorders. A family history of gambling behavior was reported by 36.70% of the participants. All demographic and clinical characteristics are included in Table 1.

Psychiatric comorbidities were assessed using the SCID-5. Of the total sample, 19 participants (31.70%) had no psychiatric comorbidity, 26 (43.30%) had one comorbidity, and 15 (25.00%) had more than one comorbidity. The most common comorbid diagnosis was major depressive disorder (MDD), observed in 21 participants (65.00% of those with comorbidity), and 21.70% reported a previous suicide attempt. The mean SOGS score among participants was 13.90 (SD = 2.74), indicating a sample characterized by high levels of gambling severity. In addition, structured clinical interviews conducted using the Structured Clinical Interview for DSM-5 disorders confirmed that all participants met the diagnostic criteria for GD, as defined by the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition. Regarding psychiatric comorbidity, 19 participants (31.7%) had no additional psychiatric diagnosis, 26 participants (43.3%) had one comorbid diagnosis, and 15 participants (25.0%) had multiple comorbidities. The most frequently observed comorbid condition was MDD ($n = 21$),

Table 1. Demographic and clinical characteristics of participants ($n = 60$)

Variable	Category	n	%
Age	Mean (SD)		35.60 (8.10)
Marital status	Married	26	43.33
	Single	23	38.33
	Divorced	11	18.33
Education level	Primary School	2	3.33
	High School	20	33.33
	University	38	63.33
Employment status	Employed	47	78.33
	Unemployed	13	21.67
Monthly income (TRY)	No income	9	15.00
	<2000	4	6.67
	2000–3000	9	15.00
	3000–5000	20	33.33
	>5000	18	30.00
MDD diagnosis (current)	No	39	65.00
	Yes	21	35.00
Psychiatric comorbidity	No	19	31.67
	Yes	41	68.33
History of MDD	No	25	41.67
	Yes	35	58.33
Suicide attempt	No	47	78.33
	Yes	13	21.67
Substance use	Never	50	83.33
	Quit	4	6.67
	Still using	6	10.00
Alcohol use	Never	9	15.00
	Quit	7	11.67
	Still using	44	73.33
Frequency of alcohol use	Never	16	26.67
	Rare (<1/month)	18	30.00
	2–4 times/month	14	23.33
	2–3 times/week	3	5.00
	≥4 times/week	9	15.00
Smoking status	Never	14	23.33
	Quit	2	3.33
	Still using	44	73.33
Smoking frequency	No	16	26.67
	1–2/week	3	5.00
	<1 pack/day	5	8.33
	1 pack/day	25	41.67
	>2 packs/day	11	18.33
Physical illness	No	47	78.33
	Yes	13	21.67
Family history of psychiatric illness	No	30	50.00
	Yes	30	50.00
Family history of gambling	No	38	63.33
	Yes	22	36.67

Note: MDD = Major depressive disorder; SD = Standard deviation; TRY = Turkish Lira (Turkish currency).

followed by attention-deficit and hyperactivity disorder ($n = 11$), alcohol use disorder ($n = 8$), bipolar disorder ($n = 7$), substance use disorder ($n = 6$), and generalized anxiety disorder ($n = 6$). Less common comorbidities included psychotic disorder ($n = 1$), obsessive-compulsive disorder ($n = 1$), panic disorder ($n = 1$), and social anxiety disorder ($n = 1$). These findings underscore the high prevalence of psychiatric comorbidities in individuals seeking treatment for GD and emphasize the need for integrated clinical assessment and intervention strategies.

Detailed gambling behavior characteristics of the sample are presented in Table 2. The mean gambling duration was 28.60 hours per week ($SD = 20.50$), and participants reported gambling on an average of 5.71 days per week ($SD = 1.73$). The average weekly amount of money spent on gambling was 13,810.00 TRY ($SD = 64.64$), and the highest amount spent in a single gambling session was 5,038.60 TRY ($SD = 179.33$). The mean duration of the longest continuous gambling period was 9.45 years ($SD = 5.72$). Regarding gambling preferences, more than half of the participants (56.66%) primarily engaged in sports betting, followed by casino games (31.66%) and horse racing (11.66%). When asked about their current gambling attitude, 56.67% reported attempting to abstain from gambling, while 43.33% continued to gamble. These findings provide a detailed overview of the intensity and financial engagement associated with gambling behavior among the sample.

Participants were grouped according to their preferred gambling type: strategic games (e.g., sports betting, horse racing) and non-strategic games (e.g., slot machines, roulette). Of the total, 41 participants (68.30%) preferred strategic games, and 19 (31.70%) preferred non-strategic games. There were no significant differences in sociodemographic or clinical variables between the two groups. However, participants preferring strategic games gambled for a longer duration (years) ($p = .005$, Mann-Whitney U test), while those who preferred non-strategic games invested higher amounts of money at a single time ($p = .025$, Mann-Whitney U test).

Prior to conducting the main analyses, the distribution of the continuous variables was evaluated. Although the sample size was slightly over 50, the Shapiro-Wilk test was preferred due to its sensitivity in small to moderate samples. In addition, skewness and kurtosis values were examined for all continuous variables, and no substantial deviations from normality were observed. These results supported the assumption of approximate normality.

Descriptive statistics for the clinical scales used in the study are presented in Table 3. The mean score for depressive symptoms measured by the Hamilton Depression Rating Scale Score (HDRS) was 9.42 ($SD = 6.74$), while the mean score for gambling severity assessed with the SOGS was 13.93 ($SD = 2.74$). The total score for gambling-related cognitions (GRCS-T) had a mean of 72.53 ($SD = 26.86$), with subscale scores ranging from 5.60 to 18.72. The treatment motivation total score (TMQ-T) was 102.05 ($SD = 9.69$), with the highest subscale mean observed in intrinsic motivation (Treatment

Table 2. Gambling characteristics of participants (n = 60)

Variable	Category / Mean (SD)	n (%) / Value
Gambling attitude	Trying not to gamble	34 (56.67)
	Continues to gamble	26 (43.33)
Most preferred game type	Sports betting	34 (56.66)
	Casino games	19 (31.66)
	Horse racing	7 (11.66)
Gambling duration (hours/week)	Mean (SD)	28.60 (20.50)
Weekly gambling expenditure (TRY)	Mean (SD)	13,810.00 (64.64)
Longest gambling period (years)	Mean (SD)	9.45 (5.72)
Gambling frequency (days/week)	Mean (SD)	5.71 (1.73)
Maximum amount spent at one time (TRY)	Mean (SD)	5038.60 (179.33)

Note: SD = Standard deviation; TRY = Turkish Lira (Turkish currency).

Table 3. Descriptive statistics for clinical scales

Scale	Mean (SD)	Median (Range)
HDRS	9.42 (6.74)	7.50 (1–25)
SOGS	13.93 (2.74)	14.00 (8–19)
GRCS-T	72.53 (26.86)	75.00 (23–127)
GRCS-1	18.72 (8.57)	19.00 (5–35)
GRCS-2	5.60 (3.52)	3.50 (3–18)
GRCS-3	13.32 (6.30)	13.50 (4–26)
GRCS-4	17.18 (6.99)	18.00 (4–28)
GRCS-5	14.57 (6.98)	14.50 (5–31)
TMQ-T	102.05 (9.69)	102.50 (82–126)
TMQ-IM	48.87 (4.55)	49.00 (41–55)
TMQ-EM	11.05 (2.93)	11.00 (5–17)
TMQ-HS	22.33 (3.95)	22.00 (13–34)
TMQ-CT	19.62 (3.92)	20.00 (13–30)

Note: GRCS-1 = Inability to Stop Gambling Score; GRCS-2 = Illusion of Control Score; GRCS-3 = Gambling Expectations Score; GRCS-4 = Interpretative Bias Score; GRCS-5 = Predictive Control Score; GRCS-T = Gambling-Related Cognition Scale Total Score; HDRS = Hamilton Rating Scale Score; SD = Standard deviation; SOGS = South Oaks Gambling Screening Test Score; TMQ-CT = Confidence in Treatment Score; TMQ-EM = External Motivation Score; TMQ-HS = Help Seeking Score; TMQ-IM = Internal Motivation Score; TMQ-T = Treatment Motivation Questionnaire Total Score.

Motivation Questionnaire-internal motivation [TMQ-IM] = 48.87, SD = 4.55), and the lowest in external motivation (TMQ-EM = 11.05, SD = 2.93). These results indicate that, on average, participants demonstrated moderate levels of depressive symptoms and gambling severity, high cognitive distortions related to gambling, and strong intrinsic motivation for treatment.

Pearson correlation coefficients were calculated to examine the relationships between depression severity, gambling severity, gambling-related cognitions, and treatment motivation dimensions. The results revealed a statistically significant positive correlation between depression severity (HDRS) and gambling severity (SOGS) ($r = .28$, $p = .030$). Depression severity was also positively associated with general gambling-related cognitions (GRCS-1; $r = .32$, $p = .013$), indicating that individuals with higher depressive symptoms tend to report stronger gambling-related cognitive distortions.

Furthermore, a significant positive correlation was observed between gambling severity (SOGS) and two subdimensions of gambling-related cognitions: interpretative bias (GRCS-3; $r = .30$, $p = .019$) and predictive control (GRCS-4; $r = .27$, $p = .037$). These findings suggest that specific cognitive distortions are closely related to increased gambling severity. In terms of treatment motivation, a negative correlation was found between confidence in treatment (TMQ-CT) and depression severity (HDRS; $r = -.27$, $p = .037$), indicating that individuals with higher levels of depressive symptoms tend to have lower confidence in their ability to succeed in treatment. Additionally, external motivation (TMQ-EM) was positively associated with gambling severity (SOGS; $r = .27$, $p = .040$), suggesting that externally driven motives may play a role in gambling behavior. No other significant correlations were observed among the remaining subscales. These results are summarized in Table 4.

Correlation analyses revealed that increases in gambling-related cognitive distortions were significantly associated with increases in both the duration of gambling behavior and the amount of money spent weekly on gambling. Specifically, higher total GRCS scores were positively correlated with the number of years spent gambling ($r = .26$, $p = .049$) and the amount of weekly gambling expenditure ($r = .28$, $p = .031$). These findings indicate that cognitive distortions may contribute to the escalation of gambling engagement over time.

In addition, participants without psychiatric comorbidity ($n = 19$) showed significantly higher levels of treatment motivation compared to those with at least one psychiatric diagnosis ($n = 26$). Although mean and standard deviation values for TMQ total scores were not specified, the difference between the two groups was found to be statistically significant (Mann-Whitney U test, $p = .049$). These results suggest that psychiatric comorbidity may negatively impact individuals' motivation to engage in treatment for gambling disorder.

Table 5 presents the comparisons of sociodemographic and clinical characteristics between the two clusters identified through the two-step cluster analysis. Chi-square tests were used to assess group differences in categorical variables. Cluster 1 had a significantly higher rate of employment (p

Table 4. Correlations between depression severity, severity of gambling-related cognitive distortions, gambling severity, and treatment motivation of participants (n = 60)

		HDRS	SOGS	GRCS-T	GRCS-1	GRCS-2	GRCS-3	GRCS-4	GRCS-5
TMQ-T	r	−0.104	0.048	0.025	−0.064	0.057	0.088	0.124	0.036
	p	.428	.717	.851	.627	.663	.503	.347	.784
TMQ-IM	r	−0.018	−0.012	0.003	−0.053	−0.012	0.068	0.077	−0.050
	p	.891	.927	.984	.685	.930	.607	.560	.702
TMQ-EM	r	0.117	0.266*	−0.095	−0.039	<0.001	−0.076	−0.093	−0.164
	p	.375	.040	.470	.769	.999	.563	.478	.211
TMQ-HS	r	−0.198	0.106	0.027	−0.039	0.159	0.063	0.138	0.099
	p	.129	.420	.839	.768	.224	.634	.293	.452
TMQ-CT	r	−0.270*	−0.205	0.023	−0.126	−0.014	0.066	0.133	0.093
	p	.037	.115	.862	.336	.913	.615	.310	.480
HDRS	r		0.280*	0.244	0.319*	0.102	0.188	0.147	0.163
	p		.030	.060	.013	.437	.150	.263	.215
SOGS	r	0.280*		0.230	0.145	0.201	0.303*	0.270*	0.148
	p	.030		.077	.268	.124	.019	.037	.258

Note: GRCS-1 = Inability to Stop Gambling Score; GRCS-2 = Illusion of Control Score; GRCS-3 = Gambling Expectations Score; GRCS-4 = Interpretative Bias Score; GRCS-5 = Predictive Control Score; GRCS-T = Gambling-Related Cognition Scale Total Score; HDRS = Hamilton Rating Scale Score; SOGS = South Oaks Gambling Screening Test Score; TMQ-CT = Confidence in Treatment Score; TMQ-EM = External Motivation Score; TMQ-HS = Help Seeking Score; TMQ-IM = Internal Motivation Score; TMQ-T = Treatment Motivation Questionnaire Total Score; *p < 0.05.

Table 5. Summarizes the sociodemographic and clinical comparison between clusters (n = 60)

Variable	Category	Total, n (%)	Cluster 1, n (%)	Cluster 2, n (%)	p
Marital status	Married	26 (43.30)	18 (47.40)	8 (36.40)	.360
	Single	23 (38.30)	12 (31.60)	11 (50.00)	
	Divorced	11 (18.30)	8 (21.10)	3 (13.60)	
Educational background	Primary education	2 (3.30)	0 (0.00)	2 (9.10)	.137
	High school	20 (33.30)	12 (31.60)	8 (36.40)	
	University	38 (63.30)	26 (68.40)	12 (54.50)	
Employment status	Employed	47 (78.30)	33 (86.80)	14 (63.60)	.036*
	Unemployed	13 (21.70)	5 (13.20)	8 (36.40)	
Psychiatric comorbidity	None	19 (31.70)	19 (50.00)	0 (0.00)	<.001**
	One diagnosis	26 (43.30)	16 (42.10)	10 (45.50)	
	More than one	15 (25.00)	3 (7.90)	12 (54.50)	
History of major depression	No	25 (41.70)	19 (50.00)	6 (27.30)	.085
	Yes	35 (58.30)	19 (50.00)	16 (72.70)	
Suicide attempt history	No	47 (78.30)	33 (86.80)	14 (63.60)	.036*
	Yes	13 (21.70)	5 (13.20)	8 (36.40)	
Substance use	Never used	50 (83.30)	38 (100.00)	12 (54.50)	<.001**
	Quit	4 (6.70)	0 (0.00)	4 (18.20)	
	Still using	6 (10.00)	0 (0.00)	6 (27.30)	
Alcohol use	Never used	9 (15.00)	8 (21.10)	1 (4.50)	.064
	Quit	7 (11.70)	6 (15.80)	1 (4.50)	
	Still using	44 (73.30)	24 (63.20)	20 (90.90)	
Smoking	Never used	14 (23.30)	14 (36.80)	0 (0.00)	.002**
	Quit	2 (3.30)	2 (5.30)	0 (0.00)	
	Still using	44 (73.30)	22 (57.90)	22 (100.00)	
Family history of psychiatric illness	No	30 (50.00)	20 (52.60)	10 (45.50)	.592
	Yes	30 (50.00)	18 (47.40)	12 (54.50)	
Game preference	Strategic games	41 (68.30)	33 (86.80)	8 (36.40)	<.001**
	Non-strategic games	19 (31.70)	5 (13.20)	14 (63.60)	

Test types: Chi-square tests used for categorical comparisons; p-values reflect significance levels.

*p < .05 is statistically significant.

**p < .01 is highly significant.

= .036), no psychiatric comorbidity ($p < .001$), no history of substance use ($p < .001$), and no current smoking ($p = .002$), compared to Cluster 2. Additionally, Cluster 1 participants were more likely to prefer strategic gambling activities such as sports betting or horse racing, whereas Cluster 2 predominantly preferred non-strategic games like slots or roulette ($p < .001$).

Table 6 summarizes the comparisons of gambling-related behaviors and clinical scale scores between the two clusters. For continuous variables, Mann-Whitney U tests were applied where appropriate. Cluster 1 participants reported significantly more frequent gambling (days per week; $p = .033$), lower depression severity (HDRS; $p = .023$), and higher treatment motivation (TMQ total; $p < .001$), particularly in internal motivation ($p = .011$), help seeking ($p = .032$), and confidence in treatment ($p = .006$).

Taken together, these findings indicate that Cluster 1 represents individuals with lower psychiatric burden, more adaptive motivational profiles, and a stronger orientation toward recovery. In contrast, Cluster 2 comprises individuals with higher psychological distress, greater clinical risk factors (e.g., comorbidities, substance use, depressive symptoms), and reduced motivation for treatment, suggesting the need for more intensive, supportive, and motivational interventions for this subgroup.

Discussion

Epidemiological research has demonstrated that individuals diagnosed with GD are more likely to exhibit co-occurring psychiatric conditions, and conversely, the prevalence of pathological gambling is elevated among individuals with

existing psychiatric disorders (Cowlshaw et al., 2016). In a recent meta-analysis, lifetime psychiatric comorbidity was reported in 75% of individuals with GD (Dowling et al., 2015). The psychiatric comorbidity rate detected in this study is compatible with the literature in this respect. In terms of the frequency of comorbidities, it was observed that the diagnosis of MDD had the highest rate (35%, $n = 21$). When depressive episodes were examined in more detail, the majority of people with a history of MDD ($n = 29$, 82.8%) stated that depression was related to gambling behavior and its consequences. A comprehensive epidemiological study (Petry et al., 2005) reported the incidence of mood disorders in cases diagnosed with GD as 49.6%. This rate is similar to the current study's findings.

When gambling participation is examined, the average time devoted to gambling in this study (28.6 hours per week) appears to be substantially higher than what has been reported in previous studies, which found an average of approximately 10 hours per week (Arcan & Karanci, 2015). This discrepancy likely reflects the clinical nature of the sample, as participants were treatment-seeking individuals with more severe gambling problems. The high frequency of gambling (an average of 5.7 days per week) and the elevated financial investment—both weekly and in single sessions—further support the severity of gambling behavior in this group. Considering that 60% of participants reported a monthly income of less than 5000 TL, the data suggest that many individuals may be experiencing significant financial strain, potentially driven by efforts to recover gambling losses or sustain gambling behavior despite limited resources.

While 68.3% of participants in this sample reported a preference for strategic games and 31.7% for non-strategic games, this distribution is meaningful in light of cognitive

Table 6. Comparison of data on gambling activities and scale scores between clusters ($n = 60$)

Variable	Cluster 1 (C1)	Cluster 2 (C2)	Total Sample	p
Age (years)	36.40	34.00	35.60	.205
Age at gambling onset (years)	25.90	26.30	26.10	.833
Weekly gambling duration (hours)	30.10	26.00	28.60	.272
Weekly money spent (TRY)	6,102.60	27,122.72	13,810.00	.647
Frequency of gambling (days/week)	6.00	5.10	5.70	.033*
Total duration of gambling (years)	10.50	7.50	9.40	.720
Max amount spent at one time (TRY)	38,802.60	70,395.40	50,386.60	.104
Number of games played in lifetime	3.10	3.10	3.10	.931
HDRS (depression score)	7.90	11.90	9.40	.023*
SOGS (gambling severity)	13.90	13.90	13.90	.959
GRCS-Total (cognitive distortions)	74.20	69.50	72.50	.509
TMQ total	105.40	96.20	102.00	<.001**
TMQ-IM	50.00	46.80	48.80	.011*
TMQ-EM	11.40	10.40	11.00	.161
TMQ-HS	23.10	20.90	22.30	.032*
TMQ-CT	20.60	17.80	19.60	.006**

Note: CT = Confidence in treatment; EM = External motivation; GRCS = Gambling-Related Cognition Scale; HDRS = Hamilton Depression Rating Scale; HS = Help seeking; IM = Internal motivation; SOGS = South Oaks Gambling Screening; TMQ = Treatment Motivation Questionnaire; TRY = Turkish Lira.

* $p < .05$ is statistically significant.

** $p < .01$ is highly significant.

processing differences highlighted in the literature. Individuals who prefer strategic games are thought to exhibit an analytical cognitive style, characterized by slower, more deliberate information processing and a tendency to invest time in understanding skill-based game mechanics (Mouneyrac et al., 2018). The pattern observed in this sample—where strategic game players were more likely to start with lower monetary investment and develop problematic gambling behavior over time—may reflect a gradual reinforcement process rooted in perceived control and skill illusion. This suggests that while the trajectory of gambling problems among strategic game users may be more prolonged, it may also be shaped by deeper cognitive distortions that sustain engagement.

These findings highlight the clinical significance of distinguishing between strategic and non-strategic gambling preferences. As observed in this study, individuals who prefer non-strategic games may require tailored interventions that address impulsivity and maladaptive coping mechanisms. Conversely, strategies targeting cognitive distortions such as the illusion of control may be more beneficial for individuals who prefer strategic games. This differentiation can guide clinicians in designing personalized treatment plans based on gambling preferences.

In this study, a positive association was observed between the severity of depression and the severity of gambling behavior. Although this finding is consistent with previous research, it is important to note that causality cannot be established due to the cross-sectional nature of the study. Greater gambling-related problems may contribute to the development of depressive symptoms, while individuals experiencing more severe depression may engage in gambling to cope with emotional distress or feelings of hopelessness (Rogier et al., 2019). Moreover, depressive symptomatology can interfere with efforts to regulate gambling behavior, reduce perceived self-efficacy for quitting, and address the financial and interpersonal consequences of gambling. These observations highlight the importance of providing effective psychopharmacological treatment for depression in individuals with gambling problems.

When psychiatric comorbidity and gambling severity were compared, no comorbidity was found to have a significant relationship with gambling severity. However, the fact that most of the participants had psychiatric comorbidities and that they were seen at higher rates than the general population supports the relationship between gambling and psychiatric comorbidity.

Gambling-related cognitive distortions are among the most extensively examined psychological mechanisms in the context of gambling behavior. In this study, distortions such as illusion of control and predictive control were linked to increased gambling severity, highlighting their central role in the development and maintenance of problematic gambling. These findings align with previous research suggesting that individuals who believe they can control or predict gambling outcomes are more likely to engage in persistent and

excessive gambling (Cowie et al., 2017; Cunningham et al., 2014). The psychological mechanism behind this may involve a false sense of control that reinforces gambling behavior even in the face of repeated losses. This distorted thinking not only intensifies gambling frequency and severity (Emond & Marmurek, 2010), but may also be particularly pronounced among those who prefer strategic games, where skill-based illusions are more prevalent (Toneatto, 1999). The relevance of these cognitive patterns extends beyond immediate behavior, offering a window into the individual's broader belief systems about gambling, its role in their life, and their perceived inability to stop, which can inform tailored therapeutic interventions.

In this study, a positive relationship was observed between the cognitive distortions of gambling expectations and interpretative bias. This finding implies that individuals who associate gambling with pleasure, perceive it as beneficial in their lives, and maintain motivation by recalling previous wins—even in the face of losses—are more likely to engage in persistent gambling behavior. Furthermore, individuals who exhibited stronger gambling-related cognitions also reported gambling over longer periods and investing greater amounts of money, suggesting that these distortions may contribute to the intensification of gambling engagement over time. In a recent large-scale multinational study (Mestre-Bach et al., 2021), it was reported that gambling-related cognitions generally increased gambling severity. However, while no differences were observed in gambling severity or game preference among the Spanish population, in the U.S. population, gambling severity was found to be higher among strategic players and those with higher predictive control scores. These contrasting findings may point to cultural differences in how gambling-related cognitions manifest and influence behavior, emphasizing the need to consider sociocultural context when developing cognitive interventions for gambling disorder.

As a result, the increase in the participants' thoughts about gambling was associated with greater gambling participation; greater gambling participation, measured by the amount of money spent on gambling and the time spent gambling, was also linked to higher gambling severity in the sample, as measured by the SOGS. This finding is thought to be important as it reveals that gambling-related thoughts with relatively abstract content become more problematic in individuals' lives as concrete gambling participation increases. What it means in practice is that correcting gambling-related thoughts whose validity and functionality will be questioned in the therapy environment would limit gambling behavior.

Regardless of the severity of gambling, a positive association was observed between depression levels and difficulties in stopping gambling behavior. This finding is consistent with previous studies. For example, Ciccarelli et al. (2017) found that pathological gamblers had significantly higher depression scores than healthy controls, and that depression was a significant predictor of gambling severity, suggesting that depressive symptoms play a critical role in maintaining gambling behaviors. Similarly, Lee and Hong (2018) also reported a strong association between depressive symptoms

and difficulty in regulating gambling urges (Ciccarelli et al., 2017; Lee & Hong, 2018).

The relationship can be interpreted in two directions: individuals with depression may perceive their self-efficacy to quit gambling as low and hesitate to take action due to symptoms such as low self-esteem, feelings of worthlessness and inadequacy, hopelessness, and psychomotor retardation. This, in turn, may further exacerbate depressive symptoms as gambling continues and financial difficulties increase, potentially leading to a sense of helplessness and even suicidal ideation. Therefore, during clinical interviews with depressed individuals, cognitions related to the inability to stop gambling should be carefully explored and addressed.

Furthermore, individuals without psychiatric comorbidities demonstrated higher treatment motivation levels compared to those with psychiatric comorbidities. This suggests that the presence of additional psychiatric diagnoses may hinder individuals' readiness or perceived capacity to engage in recovery efforts for gambling disorder. Consistent with this interpretation, prior studies have shown that psychiatric comorbidity is associated with reduced help-seeking behaviors and an increased likelihood of early treatment dropout (Cowlshaw et al., 2016; Melville et al., 2007). These findings emphasize the importance of addressing co-occurring mental health issues to enhance treatment motivation and improve engagement in clinical settings.

Depression severity, as assessed by the Hamilton Depression Rating Scale, was negatively associated with confidence in treatment. This finding, consistent with previous research (Dąbrowska et al., 2017; Melville et al., 2007), suggests that individuals with elevated depressive symptoms may experience hopelessness and low self-efficacy, leading to a belief that their condition cannot be improved and that treatment would be ineffective in addressing their gambling-related problems.

Furthermore, individuals with more severe gambling behaviors tended to report higher levels of extrinsic motivation. This trend suggests that their engagement in treatment may be primarily driven by external pressures—such as financial difficulties or interpersonal conflicts—rather than an intrinsic desire for behavioral change. Such individuals may seek treatment to avoid further loss of social or familial support, rather than to address the underlying psychological factors contributing to their gambling behavior. This interpretation aligns with prior research indicating that extrinsic motivators often serve as key drivers for treatment initiation among individuals experiencing substantial gambling-related consequences (Evans & Delfabbro, 2005). Understanding the source of treatment motivation is essential for designing more personalized and effective therapeutic interventions.

Various studies in the literature have aimed to conceptualize the clinical heterogeneity of GD through subtyping approaches. Identifying distinct clinical subgroups is critical for enhancing the personalization and effectiveness of

therapeutic interventions (Milosevic & Ledgerwood, 2010). Previous cluster analyses in GD populations have focused on gambling behaviors such as time and money spent (Heiskanen & Toikka, 2016), preferred gambling activities (Challet-Bouju et al., 2015), and emotional motivations underlying gambling behavior (Stewart et al., 2008). These diverse clustering strategies underscore the multifaceted nature of GD and highlight the need for multidimensional assessment. Building upon this foundation, this study integrates sociodemographic, clinical, behavioral, and motivational variables to derive meaningful subtypes, potentially informing more tailored treatment strategies.

In this study, the first cluster was defined by a relatively lower presence of psychopathology and higher levels of treatment motivation. This group also exhibited more favorable clinical and behavioral indicators, including higher employment rates, lower depression scores, less nicotine and substance use, fewer suicide attempts, and a preference for strategic games. These characteristics suggest that individuals in this cluster may possess more adaptive coping strategies and better overall functionality. In contrast, the second cluster was marked by greater clinical burden—higher rates of psychiatric comorbidity, substance use, and depressive symptoms—and reduced treatment motivation. Although no significant differences were observed between the clusters regarding age of gambling onset or levels of gambling activity, the preference for non-strategic games among individuals in the second cluster may reflect underlying impulsivity and the use of gambling as a maladaptive coping mechanism.

This pattern is consistent with previous research indicating that factors such as psychiatric comorbidity, substance use, and unemployment are associated with poor treatment engagement and higher dropout rates (Melville et al., 2007). Moreover, non-strategic games like slots and roulette have been linked to higher addictive potential and impulsivity (Toneatto, 1999), which may further complicate the clinical picture. While some studies have found no direct relationship between gambling severity and treatment motivation (Aragay et al., 2015; Leblond et al., 2003), the current study's findings suggest that the interplay between psychological distress and gambling preferences could influence one's readiness for change. These results underline the importance of evaluating individual risk profiles in clinical settings and adapting treatment strategies accordingly to enhance outcomes for individuals with GD.

The cluster analysis findings support the hypothesis that gambling-related variables such as gambling expenditure, duration of past gambling years, and gambling preferences are associated with gambling severity and cognitive distortions. The identification of two distinct subgroups highlights the clinical relevance of these variables, reinforcing the need for tailored intervention strategies based on individual risk profiles. Individuals with higher psychological distress and reduced motivation may require more intensive therapeutic interventions, while those in the first cluster may benefit more from motivational enhancement strategies.

Depression severity, gambling-related cognitions, and treatment motivation are important factors in the treatment of GD. Patients applying for treatment should be evaluated in terms of their treatment motivation levels and comorbid psychopathologies. Moreover, gambling-related cognitive distortions should be systematically assessed and addressed during therapy, especially by exploring their personal meaning and validity in a therapeutic context.

Limitations and Directions for Future Research

This study has several limitations. First, the sample consisted solely of treatment-seeking individuals diagnosed with GD, which limits the generalizability of the findings to non-treatment-seeking populations. The sample also excluded professional gamblers, whose gambling behavior patterns may differ significantly from those driven by emotional escape or anxiety. Furthermore, the sample consisted entirely of male participants, preventing any gender-based comparisons in gambling behavior. The relatively small sample size and cross-sectional design further limit the scope of inference. Additionally, the TMQ used in the study was originally developed for individuals with alcohol or substance use problems and is based on self-report, which may reduce its reliability in a GD population.

Despite these limitations, the study has several noteworthy strengths. It was conducted in a tertiary care addiction unit, with participants clinically diagnosed using a gold-standard structured interview (SCID-5-CV). The clinician-rated Hamilton Depression Scale was used instead of a self-report tool, providing a more objective assessment of depressive symptoms. Importantly, the study included information from family members, which enhanced data reliability—particularly in detecting concealed or minimized gambling behaviors. The sample's exclusive focus on individuals seeking treatment for gambling problems allowed for a detailed exploration of clinical profiles, including gambling-related cognitive distortions, depression, and treatment motivation, making it one of the few in Türkiye to do so comprehensively. These features increase the clinical utility and ecological validity of the findings.

For future research, it is recommended to conduct longitudinal studies with larger and more diverse samples, including female participants and non-treatment-seeking individuals, to better understand the progression and treatment outcomes of GD. In addition, studies using structural equation modeling or mediation/moderation analyses may help clarify the mechanisms underlying the relationships among variables. Incorporating mixed-method approaches that include both qualitative and quantitative data could provide a more comprehensive understanding of individual experiences and treatment processes. Finally, cross-cultural studies examining gambling-related cognitions and motivations within the framework of cultural values and norms may further enrich the literature.

Author contributions

Conception: İ.P., H.C., O.P.; Design: İ.P., H.C.; Data acquisition: İ.P., H.C.; Data analysis: İ.P., H.C.; Data interpretation: İ.P., H.C., O.P.; Drafting of the manuscript: İ.P., H.C., O.P.; Critical revision of the manuscript: İ.P., H.C., O.P. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Ethics Committee of Ege University (Date: May 17, 2021, Decision/Protocol No: 2021/34). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Akdemir, A., Türkçapar, M. H., Örsel, S. D., Demirergi, N., Dag, I., & Özbay, M. H. (2001). Reliability and validity of the Turkish version of the Hamilton Depression Rating Scale. *Comprehensive Psychiatry*, 42(2), 161-165. [\[Crossref\]](#)
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5) Fifth Edition*. American Psychiatric Association. [\[Crossref\]](#)
- Aragay, N., Jiménez-Murcia, S., Granero, R., Fernández-Aranda, F., Ramos-Grille, I., Cardona, S., Garrido, G., Anisul Islam, M., Menchón, J. M., & Vallès, V. (2015). Pathological gambling: Understanding relapses and dropouts. *Comprehensive Psychiatry*, 57, 58-64. [\[Crossref\]](#)
- Arcan, K., & Karanci, A. N. (2015). Adaptation study of the Turkish version of the gambling-related cognitions scale (GRCS-T). *Journal of Gambling Studies*, 31(1), 211-224. [\[Crossref\]](#)

- Boffo, M., Smits, R., Salmon, J. P., Cowie, M., Jong, D. T. H. A., Salemink, E., Collins, P., Stewart, S. H., & Wiers, R. W. (2017). Luck, come here! automatic approach tendencies toward gambling cues in moderate- to high-risk gamblers. *Addiction*, 113(2), 289-298. [\[Crossref\]](#)
- Buckholtz, J. W., & Meyer-Lindenberg, A. (2012). Psychopathology and the human connectome: Toward a transdiagnostic model of risk for mental illness. *Neuron*, 74(6), 990-1004. [\[Crossref\]](#)
- Calado, F., & Griffiths, M. D. (2016). Problem gambling worldwide: An update and systematic review of empirical research (2000-2015). *Journal of Behavioral Addictions*, 5(4), 592-613. <https://akjournals.com/doi/10.1556/2006.5.2016.073>
- Castrén, S., Kontto, J., Alho, H., & Salonen, A. H. (2017). The relationship between gambling expenditure, socio-demographics, health-related correlates and gambling behaviour-A cross-sectional population-based survey in finland. *Addiction*, 113(1), 91-106. [\[Crossref\]](#)
- Challet-Bouju, G., Hardouin, J.-B., Renard, N., Legauffre, C., Valleur, M., Magalon, D., Fatséas, M., Chéreau-Boudet, I., Gorsane, M.-A., Vénisse, J.-L., & Grall-Bronnec, M. (2015). A gamblers clustering based on their favorite gambling activity. *Journal of Gambling Studies*, 31(4), 1767-1788. [\[Crossref\]](#)
- Ciccarelli, M., Griffiths, M. D., Nigro, G., & Cosenza, M. (2017). Decision making, cognitive distortions and emotional distress: A comparison between pathological gamblers and healthy controls. *Journal of Behavior Therapy and Experimental Psychiatry*, 54, 204-210. [\[Crossref\]](#)
- Cowie, M. E., Stewart, S. H., Salmon, J. P., Collins, P., Al-Hamdani, M., Boffo, M., Salemink, E., de Jong, D., Smits, R., & Wiers, R. W., De Jong, D., Smits, R., & Wiers, R. W. (2017). Distorted beliefs about luck and skill and their relation to gambling problems and gambling behavior in Dutch gamblers. *Frontiers in Psychology*, 8, 2245. [\[Crossref\]](#)
- Cowlishaw, S., Hakes, J. K., & Dowling, N. A. (2016). Gambling problems in treatment for affective disorders: Results from the National Epidemiologic Survey on Alcohol and Related Conditions (NESARC). *Journal of Affective Disorders*, 202, 110-114. [\[Crossref\]](#)
- Cunningham, J. A., Hodgins, D. C., & Toneatto, T. (2014). Relating severity of gambling to cognitive distortions in a representative sample of problem gamblers. *Journal of Gambling Issues*, (29). [\[Crossref\]](#)
- Dąbrowska, K., Moskalewicz, J., & Wieczorek, Ł. (2017). Barriers in access to the treatment for People with gambling disorders. Are they different from those experienced by people with alcohol and/or drug dependence? *Journal of Gambling Studies*, 33(2), 487-503. [\[Crossref\]](#)
- Dowling, N. A., Cowlishaw, S., Jackson, A. C., Merkouris, S. S., Francis, K. L., & Christensen, D. R. (2015). Prevalence of psychiatric comorbidity in treatment-seeking problem gamblers: A systematic review and meta-analysis. *Australian and New Zealand Journal of Psychiatry*, 49(6), 519-539. [\[Crossref\]](#)
- Duvarcı, İ., & Varan, A. (2001). Reliability and validity study of the Turkish form of the south oaks gambling screen. *Türk Psikiyatri Dergisi*, 12(1), 34-45.
- Elbir, M., Alp Topbaş, Ö., Bayad, S., Kocabaş, T., Topak, O. Z., Çetin, Ş., Özdel, O., Ateşçi, F., & Aydemir, Ö. (2019). Adaptation and reliability of the structured clinical interview for DSM-5-Disorders - Clinician version (SCID-5/CV) to the Turkish language. *Turkish Journal of Psychiatry*, 30(1), 51-56. [\[Crossref\]](#)
- Emond, M. S., & Marmurek, H. H. C. (2010). Gambling related cognitions mediate the association between thinking style and problem gambling severity. *Journal of Gambling Studies*, 26(2), 257-267. [\[Crossref\]](#)
- Evans, L., & Delfabbro, P. H. (2005). Motivators for change and barriers to help-seeking in Australian problem gamblers. *Journal of Gambling Studies*, 21(2), 133-155. [\[Crossref\]](#)
- Evren, C., Saatçioğlu, Ö., Dalbudak, E., Danişmant, B. S., Çakmak, D., & Ryan, R. M. (2006). Factorial structure and reliability and validity of Turkish version treatment motivation questionnaire (TMQ) in alcohol dependents. *Journal of Dependence*, 90(216), 117-122. http://selfdeterminationtheory.org/SDT/documents/2006_TMQ_Turkish_Evren.pdf
- First, M. B., Williams, J. B., Karg, R. S., & Spitzer, R. L. (2015). *Structured Clinical Interview for DSM-5 Disorders, Clinician Version (SCID-5-CV)*. American Psychiatric Association Publishing.
- Fortune, E. E., & Goodie, A. S. (2012). Cognitive distortions as a component and treatment focus of pathological gambling: A review. *Psychology of Addictive Behaviors*, 26(2), 298-310. [\[Crossref\]](#)
- Gomes, K., & Pascual-Leone, A. (2009). Primed for change: Facilitating factors in problem gambling treatment. *Journal of Gambling Studies*, 25(1), 1-17. [\[Crossref\]](#)
- Hamilton, M. (1960). A rating scale for depression. *Journal of Neurology, Neurosurgery, and Psychiatry*, 23(1), 56-62. [\[Crossref\]](#)
- Heiskanen, M., & Toikka, A. (2016). Clustering Finnish gambler profiles based on the money and time consumed in gambling activities. *Journal of Gambling Studies*, 32(2), 363-377. [\[Crossref\]](#)
- Hodgins, D. C., Stea, J. N., & Grant, J. E. (2011). Gambling disorders. *Lancet*, 378(9806), 1874-1884. [\[Crossref\]](#)
- Karyotaki, E., Kleiboer, A., Smit, F., Turner, D. T., Pastor, A. M., Andersson, G., Berger, T., Botella, C., Breton, J. M., Carlbring, P., Christensen, H., De Graaf, E., Griffiths, K., Donker, T., Farrer, L., Huibers, M. J., Lenndin, J., Mackinnon, A., Meyer, B., Moritz, S. (2015). Predictors of treatment dropout in self-guided web-based interventions for depression: An 'individual patient data' meta-analysis. *Psychological Medicine*, 45(13), 2717-2726. [\[Crossref\]](#)
- Leblond, J., Ladouceur, R., & Blaszczynski, A. (2003). Which pathological gamblers will complete treatment? *British Journal of Clinical Psychology*, 42(2), 205-209. [\[Crossref\]](#)
- Ledgerwood, D. M., Dyshniku, F., McCarthy, J. E., Ostojic-Aitkens, D., Forfitt, J., & Rumble, S. C. (2020). Gambling-related cognitive distortions in residential treatment for gambling disorder. *Journal of Gambling Studies*, 36(2), 669-683. [\[Crossref\]](#)
- Lee, K., & Hong, J. (2018). Mediating effect of depression on the relationship between gambling severity and cognitive distortion: Secondary data analysis of Korea center on gambling problems. *Journal of Korean Academy of Psychiatric and Mental Health Nursing*, 27(4), 370. [\[Crossref\]](#)
- Leonard, C. A., Williams, R. J., & McGrath, D. S. (2021). Gambling fallacies: Predicting problem gambling in a national sample. *Psychology of Addictive Behaviors*, 35(8), 939-947. [\[Crossref\]](#)
- Lesieur, H. R., & Blume, S. B. (1987). The South Oaks Gambling Screen (SOGS): A new instrument for the identification of pathological gamblers. *American Journal of Psychiatry*, 144(9), 1184-1188. [\[Crossref\]](#)

- Mallorquí-Bagué, N., Mestre-Bach, G., Lozano-Madrid, M., Fernandez-Aranda, F., Granero, R., Vintró Alcaraz, C. V., Del Pino-Gutiérrez, A., Steward, T., Gómez-Peña, M., Aymamí, N., Mena-Moreno, T., Menchón, J. M., & Jiménez-Murcia, S. (2018). Trait impulsivity and cognitive domains involving impulsivity and compulsivity as predictors of gambling disorder treatment response. *Addictive Behaviors, 87*, 169-176. [\[Crossref\]](#)
- Melville, K. M., Casey, L. M., & Kavanagh, D. J. (2007). Psychological treatment dropout among pathological gamblers. *Clinical Psychology Review, 27*(8), 944-958. [\[Crossref\]](#)
- Mestre-Bach, G., Steward, T., Balodis, I. M., Vintró-Alcaraz, C., Granero, R., Fernández-Aranda, F., Menchón, J. M., Jiménez-Murcia, S., & Potenza, M. N. (2021). A comparison of gambling-related cognitions and behaviors in gamblers from the United States and Spain. *Journal of Gambling Studies, 37*(1), 319-333. [\[Crossref\]](#)
- Milosevic, A., & Ledgerwood, D. M. (2010). The subtyping of pathological gambling: A comprehensive review. *Clinical Psychology Review, 30*(8), 988-998. [\[Crossref\]](#)
- Mouneyrac, A., Lemerrier, C., Le Floch, V., Challet-Bouju, G., Moreau, A., Jacques, C., & Giroux, I. (2018). Cognitive characteristics of strategic and non-strategic gamblers. *Journal of Gambling Studies, 34*(1), 199-208. [\[Crossref\]](#)
- Myrseth, H., Brunborg, G. S., & Eidem, M. (2010). Differences in cognitive distortions between pathological and non-pathological gamblers with preferences for chance or skill games. *Journal of Gambling Studies, 26*(4), 561-569. [\[Crossref\]](#)
- Nicholson, R., Graves, C., Ellery, M., & Afifi, T. O. (2016). The temporal relationship between faulty gambling cognitions and gambling severity in young adults. *Journal of Gambling Studies, 32*(4), 1215-1229. [\[Crossref\]](#)
- Oei, T. P. S., & Gordon, L. M. (2008). Psychosocial factors related to gambling abstinence and relapse in members of gamblers anonymous. *Journal of Gambling Studies, 24*(1), 91-105. [\[Crossref\]](#)
- Petry, N. M., Stinson, F. S., & Grant, B. F. (2005). Comorbidity of DSM-IV pathological gambling and other psychiatric disorders: Results from the national epidemiologic survey on alcohol and related conditions. *Journal of Clinical Psychiatry, 66*(5), 564-574. [\[Crossref\]](#)
- Raylu, N., & Oei, T. P. S. (2004). The Gambling Related Cognitions Scale (GRCS): Development, confirmatory factor validation and psychometric properties. *Addiction, 99*(6), 757-769. [\[Crossref\]](#)
- Rogier, G., Picci, G., & Velotti, P. (2019). Struggling with happiness: A pathway leading depression to gambling disorder. *Journal of Gambling Studies, 35*(1), 293-305. [\[Crossref\]](#)
- Ryan, R. M., Plant, R. W., & O'Malley, S. (1995). Initial motivations for alcohol treatment: Relations with patient characteristics, treatment involvement, and dropout. *Addictive Behaviors, 20*(3), 279-297. [\[Crossref\]](#)
- Schluter, M. G., Kim, H. S., Poole, J. C., Hodgins, D. C., McGrath, D. S., Dobson, K. S., & Taveres, H. (2019). Gambling-related cognitive distortions mediate the relationship between depression and disordered gambling severity. *Addictive Behaviors, 90*, 318-323. [\[Crossref\]](#)
- Stewart, S. H., Zack, M., Collins, P., Klein, R. M., & Fragopoulos, F. (2008). Subtyping pathological gamblers on the basis of affective motivations for gambling: Relations to gambling problems, drinking problems, and affective motivations for drinking. *Psychology of Addictive Behaviors, 22*(2), 257-268. [\[Crossref\]](#)
- Toneatto, T. (1999). Cognitive psychopathology of problem gambling. *Substance Use and Misuse, 34*(11), 1593-1604. [\[Crossref\]](#)

Aging and exercise: Addiction risks unveiled

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Abstract

This study aims to investigate exercise addiction among middle-aged and older adults and examine the psychological, social, and biological factors influencing this addiction. Among the participants, 41 middle-aged and 26 older adults were identified as exercise addicts. Exercise addiction levels were assessed using the Exercise Addiction Inventory. Health-promoting behaviors were evaluated with the Health-Promoting Behavior Scale, health anxiety with the Health Anxiety Inventory, and death anxiety with the Death Anxiety Scale. Scores on the Exercise Addiction Inventory, Health-Promoting Behavior Scale, Health Anxiety Inventory, and Death Anxiety Scale were significantly higher in the older group compared to the middle-aged group ($p = .001$, $p = .041$, $p = .002$, and $p = .047$, respectively). In the middle-aged group, no significant associations were found between exercise addiction and health-promoting behaviors, health anxiety, or death anxiety ($p > .05$). In the older group, however, moderate and significant correlations were observed between exercise addiction and health-promoting behaviors ($r = 0.454$, $p = .020$) as well as death anxiety ($r = 0.425$, $p = .030$). A strong and significant relationship was also identified between exercise addiction and health anxiety in the older group ($r = 0.717$, $p < .001$). The findings suggest that exercise addiction in older adults is associated with psychological and behavioral factors, including health anxiety, health-promoting behaviors, and death anxiety.

Keywords: addictive, aged, anxiety, death, exercise

Main points

- Exercise addiction in older adults is significantly associated with psychological factors such as health anxiety, health-protective behaviors, and death anxiety.
- In middle-aged adults, exercise addiction is less influenced by psychological factors, with exercise primarily serving as a means of psychological relaxation and stress management.
- Exercise addiction in older adults may be driven by psychological factors such as health anxiety and death anxiety, highlighting the importance of psychological support in the development of treatment and prevention strategies.

Introduction

The middle-aged and older adult populations represent a rapidly growing demographic across various regions worldwide (Qiu et al., 2023). Aging is a multifaceted period influenced by the interaction of biological, social, and psychological factors, often leading to various negative consequences (Asejeje & Ogunro, 2024). Many intervention strategies have been created to reduce the harmful effects of aging, with exercise recognized as a cornerstone of these methods. Regular physical activity is vital in preserving health, independence, and enhancing the overall quality of life for elderly individuals. Specifically, exercise enhances cardiovascular

health, strengthens muscles and bones, improves balance, coordination, and flexibility, supports cognitive function, aids in managing chronic illnesses, decreases the risk of falls, and boosts mental well-being (Galloza et al., 2017; Sabat et al., 2024).

Despite the well-documented benefits of exercise, its frequent recommendation by families and healthcare providers necessitates a nuanced perspective. Aging often brings increased health challenges and mental vulnerability, predisposing individuals to various forms of dependency. Common dependencies observed among older adults include substance use, medication reliance, gambling, shopping,

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and internet use (Billieux et al., 2015; Koechl et al., 2012). Additionally, excessive emotional attachment in personal relationships is also prevalent in this demographic ( avu o lu & Demirkol, 2018).

While exercise is widely regarded as integral to healthy aging, an overemphasis on its role in maintaining health combined with anxiety related to illness and mortality may lead some older adults to develop a compulsive focus on physical activity. Such compulsive engagement with exercise can overshadow other important aspects of life and, paradoxically, detract from overall well-being (Hausenblas & Giacobbi, 2004). These circumstances raise concerns about the potential for exercise to evolve into an addiction in some individuals. Exercise addiction was initially identified by Baekeland (1970) during participant screening for a study investigating the effects of exercise deprivation on sleep patterns (Baekeland, 1970).

Exercise addiction is marked by a compelling, uncontrollable need to participate in physical activities, even when it leads to adverse effects. In contrast to substance-related disorders, exercise addiction is frequently overlooked, as the emphasis on regular exercise as part of a healthy lifestyle often obscures its recognition (H dzlik et al., 2024). Exercise addiction, like other addictions, involves six core components: salience, tolerance, mood modification, withdrawal, conflict, and relapse (H dzlik et al., 2024).

Salience makes exercise the central focus of life, while tolerance drives individuals to increase workout intensity or duration. Mood modification leads to reliance on exercise for emotional relief, but withdrawal symptoms like anxiety emerge without it. Conflict strains relationships and health, and relapse often follows attempts to reduce excessive exercise. This condition is often characterized by compulsive tendencies and a psychological dependency that are absent in those merely dedicated to regular exercise (Zmijewski & Howard, 2003). People with exercise addiction frequently view physical activity as the central focus of their lives, experiencing withdrawal-like symptoms when unable to exercise (Zmijewski & Howard, 2003).

While existing research on exercise addiction has largely focused on younger adults—primarily linked to concerns about physical appearance and performance—the phenomenon in older populations remains understudied.

The main goal of this study is to explore exercise addiction in middle-aged and older adults and examine the biological, social, and psychological factors that contribute to this addiction. A review of the literature reveals a notable gap in research addressing exercise addiction in older populations. This study seeks to fill this gap by investigating the causes or consequences of exercise addiction later in life. The findings aim to inform the development of prevention and treatment programs tailored to older adults while contributing to a more balanced understanding of the benefits and risks of exercise in this demographic.

Material and Methods

Ethical approval for the study was obtained from the Ethics Committee for Non-Interventional Health Sciences Research at Istanbul Okan University (approval date: September 11, 2024, reference no.: 11.09.2024-180). The study was conducted in accordance with the Helsinki Declaration. Before the assessments, all participants were informed about the objectives of the study and provided written informed consent. Following consent, participants' exercise addiction was determined using the Exercise Addiction Inventory (EAI). A recent study highlights an EAI assessment tool that effectively frames exercise addiction as a recognized condition while clearly outlining its distinct components (Sicilia et al., 2022). According to the EAI, participants scoring 24 or above were divided into two groups of 25 individuals based on their age groups.

Individuals aged 45 and older who scored 24 or above on the EAI and were able to cooperate in completing the questionnaires were included in the study. Exclusion criteria included the presence of orthopedic, neurological, neuromuscular, or rheumatological diseases that would impede participation, advanced cardiopulmonary disease, respiratory failure, dementia, Alzheimer's disease, or severe cognitive impairments, as well as malignancy.

Power Analysis and Sample Size

The sample size for the study was calculated using the G*POWER (version 3.1.9.7) power analysis program. Based on the study by Bueno-Antequera et al. (2022), the effect size for exercise addiction was calculated as 0.81, indicating that a minimum of 25 individuals should be included in each group to achieve 80% statistical power at a 5% significance level. Consequently, the goal was to recruit a minimum of 50 participants for the study (Bueno-Antequera et al., 2022).

Method

In this descriptive study, data were collected using a convenience sampling method from individuals aged 45 and older residing in Türkiye who exhibit exercise addiction. Assessments were conducted either face-to-face or online through WhatsApp, Facebook, and email groups using Google Forms, with each session lasting approximately 15 minutes.

Assessments

The sociodemographic characteristics of the participants (age, height, body weight, gender, education level, employment status, physical activity status) were recorded using the "Socio-Demographic Information Form."

Exercise Addiction Inventory: The EAI was used to measure the levels of exercise addiction among participants. The inventory consists of six items, rated on a scale from 1 (strongly disagree) to 5 (strongly agree). The total score ranges from 6 to 30, with a score of 24 or higher indicating a risk of exercise

addiction. The validity and reliability of the Turkish version of the EAI were conducted by Aydin et al. (2023). The original scale had a Cronbach's alpha reliability coefficient of 0.84, while the Turkish version yielded a coefficient of 0.80 (Terry et al., 2004; Aydin et al., 2023).

Health Protective Behavior Scale (HPBS): The HPBS was developed to identify individuals' health-protective behaviors. The scale consists of 32 items and has five sub-dimensions: interpersonal relationships, general behaviors, self-information, nutrition behaviors, and healthcare. The first five questions use a binary Likert scale, while the remaining questions are scored using a 5-point Likert scale. Each dimension of the HPBS and the overall scale score are obtained by summing the responses to the questions, with total scores ranging from 32 to 145. As the score from the scale increases, the health-protective behavior also increases. The validity and reliability of the Turkish version of the scale were established by  dek et al. (2022). The internal consistency for the Turkish version was indicated by a Cronbach's alpha coefficient of 0.85 ( dek et al., 2022).

Health Anxiety Inventory (HAI): The HAI is an 18-item scale developed to assess health anxiety. Fourteen items inquire about individuals' mental states using four-point response options, while the remaining four items ask participants to hypothesize their mental states if they were to have a serious illness. Each item is scored on a scale from 0 to 3, with higher scores indicating higher levels of health anxiety. The Turkish validity and reliability study of the scale was conducted by Aydemir et al. (2013), finding a Cronbach's alpha coefficient of 0.92 for the Turkish version (Aydemir et al., 2013).

Death Anxiety Scale (DAS): The DAS is a 20-item scale developed to assess individuals' death anxiety. Items are formatted in a 5-point Likert scale, with 0 points assigned for a "never" response and 4 points for an "always" response. The scale is scored from 0 to 80, with higher scores indicating higher death anxiety. Scores ranging from 0 to 29 indicate low levels of death anxiety, 30-59 indicate moderate levels, and 60-80 indicate high levels of death anxiety. The internal consistency was determined with a Cronbach's alpha coefficient of 0.95 (Sankaya & Balog lu, 2016).

Statistical Analysis

Data analysis was conducted using SPSS 25 (IBM SPSS Corp.; Armonk, NY, USA). Descriptive statistics (mean, standard deviation, median, count, and percentage) were provided for categorical and continuous variables. The homogeneity of variances, a prerequisite for parametric tests, was checked using Levene's test, and the normality assumption was evaluated with the Shapiro-Wilk test. Comparisons of scale scores for binary categorical variables were analyzed using Student's *t*-test when parametric conditions were met and the Mann-Whitney *U*-test when they were not. Relationships between categorical variables were assessed using Fisher's exact test and the chi-square test. A *p*-value of less than .05 was considered statistically significant.

Results

The sociodemographic data of the participants are presented in Table 1 according to groups. Significant differences were observed among the groups in terms of age, employment status, and the presence of chronic diseases ($p < .05$).

The comparison of questionnaire scores (EAI, HPBS, HAI, Turkish Death Anxiety Scale [TDAS]) between groups is presented in Table 2. Exercise Addiction Inventory scores were significantly higher in the elderly group (25.88 ± 1.75) compared to the middle-aged group (24.80 ± 1.86) ($p = .001$). Similarly, HPBS scores were elevated in the elderly group (124.69 ± 14.97) relative to the middle-aged group (117.73 ± 15.84) ($p = .041$). Furthermore, HAI scores were significantly higher in the elderly group (22.04 ± 10.77) than in the middle-aged group (14.05 ± 9.77) ($p = .002$). Turkish Death Anxiety Scale scores also followed a similar pattern, being significantly greater in the elderly group (37.77 ± 17.66) compared to the middle-aged group (27.61 ± 22.45) ($p = .047$).

In the middle-aged group, there was no significant relationship between exercise addiction and health protection behavior, health anxiety, and fear of death ($p > .05$) (Table 3). However, in

Table 1. Comparison of the sociodemographic data of the groups

	Middle-Aged Group (n = 41)	Elderly Group (n = 26)	p
Age (mean $\pm$ SD), years	51.41 $\pm$ 4.36	70.19 $\pm$ 4.56	<.001a*
BMI (mean $\pm$ SD)	24.79 $\pm$ 3.38	24.73 $\pm$ 2.90	.545a
Sex			
Female (n (%))	24 (58.5)	9 (34.6)	0.058b
Male (n (%))	17 (41.5)	17 (65.4)	
Education			0.060b
Primary school	3 (7.3)	2 (7.7)	
Middle school	1 (2.4)	2 (7.7)	
High school	7 (17.1)	11 (42.3)	
University	19 (46.3)	6 (23.1)	
Postgraduate	11 (26.8)	5 (19.2)	
Employment status			<0.001b*
Not working	3 (7.3)	1 (3.8)	
Working	28 (68.3)	4 (15.4)	
Retired	9 (22)	20 (76.9)	
Unemployed	1 (2.4)	1 (3.8)	
Chronic disease			0.005b*
No (n (%))	37 (90.2)	16 (61.5)	
Yes (n (%))	4 (9.8)	10 (38.5)	
Regular physical activity			0.638b
No (n (%))	2 (4.9)	2 (7.7)	
Yes (n (%))	39 (95.1)	24 (92.3)	

Note: BMI = Body mass index; SD = Standard deviation.

aMann-Whitney *U*-test.

bChi-square test.

* $p < .05$.

the elderly group, a moderate significant association was seen between exercise addiction and health protection behavior and fear of death ($r = 0.454$, $p = .020$ and $r = 0.425$, $p = .030$, respectively), as well as a strong significant relationship between health anxiety ($r = 0.717$, $p < .001$) (Table 4).

Discussion

The aim of this study was to investigate exercise addiction among middle-aged and older adults and examine the psychological, social, and biological factors influencing this addiction. The findings revealed that in elderly individuals, exercise addiction is closely associated with psychological and behavioral factors such as health anxiety, health-protective behaviors, and fear of death.

Studies on exercise addiction have primarily focused on athletes, while those examining recreational exercisers have

often aimed to explore the underlying etiology of addiction risk. For instance, a study investigating the association between exercise addiction risk and psychological distress in recreational exercisers aged 13–65 reported that individuals at high risk for exercise addiction experienced greater depression and emotional stress (Lichtenstein et al., 2018). Another study assessed psychiatric disorders accompanying exercise addiction in adults, revealing that individuals with exercise addiction exhibited various mental health disorders. Furthermore, the comorbidity of mental disorders was linked to the level of exercise addiction (Meyer et al., 2021). Similarly, in middle-aged individuals engaging in more than 10 hours of exercise per week, exercise addiction risk was found to be associated with depression, attention deficit hyperactivity disorder, and childhood traumas (Colledge et al., 2021).

This study found that among middle-aged adults, exercise addiction was not associated with health-protective behaviors, health anxiety, or fear of death. This suggests that in this group, exercise addiction may not stem from health-related concerns or preventive behaviors but instead may be driven by emotional and psychological factors. For middle-aged individuals, exercise often serves as a coping mechanism for stress, a tool for emotional regulation, or a pursuit of psychological relaxation, rather than being motivated by health concerns or fear of death. These findings highlight the need to view exercise addiction not just as a physical health issue but also as one deeply connected to psychological well-being, emphasizing the importance of psychological interventions in its management.

The literature review revealed a notable lack of studies focusing specifically on exercise addiction in elderly populations. However, this study identified a relationship between exercise addiction and factors such as health-protective behaviors, health anxiety, and fear of death in elderly individuals. The absence of these associations in middle-aged adults may be due to their relatively lower levels of health-related concerns, which influence their motivations for exercise differently. In middle adulthood, exercise is more likely driven by lifestyle, higher life satisfaction (Petry, 2002) and social motivations rather than by health anxieties at levels associated with addiction. In contrast, the heightened exercise addiction observed in older adults may be associated with the increased prevalence of health concerns and elevated death anxiety commonly linked to aging. A study by Cho (2002), aligning with the current results, found that elderly individuals engaged in regular exercise more frequently than their middle-aged counterparts (Cho & Kim, 2020).

A study aimed at exploring healthy lifestyle behaviors among elderly individuals and examining the relationship between these behaviors and geriatric depression among rural populations found that many elderly people do not engage in sufficient health-protective activities, such as exercise. Regular physical activity was associated with lower geriatric depression scores, with physically active elderly individuals exhibiting better overall mental health outcomes and fewer depressive symptoms. However, physical discomfort and lack of social support were identified as significant barriers to

Table 2. Comparison of the questionnaire scores of the groups

	Group		p
	Middle-Aged (n = 41) Mean $\pm$ SD	Elderly Group (n = 26) Mean $\pm$ SD	
EAI	24.80 $\pm$ 1.86	25.88 $\pm$ 1.75	.001
HPBS	117.73 $\pm$ 15.84	124.69 $\pm$ 14.97	.041
HAI	14.05 $\pm$ 9.77	22.04 $\pm$ 10.77	.002
TDAS	27.61 $\pm$ 22.45	37.77 $\pm$ 17.66	.047

Mann–Whitney U test was used.

Note: EAI = Exercise Addiction Inventory; HAI = Health Anxiety Inventory; HPBS = Health Protection Behavior Scale; SD = Standard deviation; TDAS = Turkish Death Anxiety Scale.

Table 3. Correlation of the exercise addiction with other questionnaire scores of the middle-aged group

	EAI	
	r	p
HPBS	0.191	.232
HAI	0.009	.954
TDAS	0.164	.305

Spearman correlation analysis was used.

EAI = Exercise Addiction Inventory; HAI = Health Anxiety Inventory; HPBS = Health Protection Behavior Scale; r = correlation coefficient; TDAS = Turkish Death Anxiety Scale.

Table 4. Correlation of the exercise addiction with other questionnaire scores of the elder group

	EAI	
	r	p
HPBS	0.454	.020
HAI	0.717	<.001
TDAS	0.425	.030

Spearman correlation analysis was used.

EAI = Exercise Addiction Inventory; HAI = Health Anxiety Inventory; HPBS = Health Protection Behavior Scale; r = correlation coefficient; TDAS = Turkish Death Anxiety Scale.

engaging in health-protective behaviors like exercise (Chang et al., 2013).

This study also found a moderate relationship between exercise addiction and health-protective behaviors. This suggests that regular physical activity contributes not only to physical health but also to mental health and social support, enhancing overall quality of life. Thus, promoting exercise programs among elderly individuals and addressing barriers such as physical discomfort and lack of social support could effectively encourage healthy lifestyle behaviors. Developing targeted strategies to overcome these challenges may help improve the physical and mental well-being of elderly individuals while reducing their risk of exercise addiction.

Health anxiety is characterized by the tendency to interpret common physical sensations negatively, often leading to excessive worry, even in the absence of a diagnosable medical condition (Aydemir et al., 2013). It is commonly believed that health-related concerns and anxiety increase with age, as individuals may become more preoccupied with their physical well-being and potential illnesses (Yang et al., 2022). Supporting this notion, studies have demonstrated that older adults often report higher levels of health-related anxiety, particularly when diagnosed with an anxiety disorder (Lindesay et al., 2012; Montorio et al., 2003). Similarly, this study found that health anxiety index scores were higher in the elderly group compared to the middle-aged.

Interestingly, some research challenges the assumption that health anxiety uniformly increases with age. While objective health metrics often decline in older adults, many adjust their subjective health assessments, perceiving themselves as healthier than their medical conditions might suggest (Pinquart, 2001). For instance, Bourgault-Fagnou and Hadjistavropoulos (2009) reported no differences in health anxiety levels between older and young adults, highlighting the complexity of health perceptions in aging populations.

This study further revealed a strong correlation between exercise addiction and health anxiety in the elderly group, indicating that frequent exercise may serve as a coping mechanism for managing health-related concerns. Elderly individuals might engage in exercise as a way to alleviate anxiety about their health and maintain a sense of physical well-being. In contrast, this association was not observed in the middle-aged group, who may have different motivations for exercise. For middle-aged individuals, exercise could be influenced by factors such as lifestyle, aesthetics, or social interactions, as they typically experience fewer immediate health concerns compared to older adults. These findings highlight the importance of addressing health anxiety and its impact on exercise behaviors, particularly in aging populations, to support both mental and physical well-being.

Death anxiety is a normal part of the human experience, yet it can develop into a debilitating phobia in older adults (Iverach et al., 2014). Several factors contribute to the intensity of death anxiety, including life satisfaction, quality of life, age, gender, religious beliefs, physical health, and cultural background

(Dadfar & Lester, 2015). Poordad et al. (2019) reported a moderate-to-high prevalence of death anxiety among older adults, which aligns with the findings of this study, where elderly participants demonstrated significantly higher death anxiety scores than those in middle age. However, contrasting results have also been observed in other studies, which suggest that death anxiety increases during middle age and declines in later years (Bengtson et al., 1977). These differences may be due to discrepancies in study settings, sample sizes, and the specific populations examined.

This study further revealed a moderate correlation between exercise addiction and death anxiety scores in the elderly group. While there is limited research directly linking exercise addiction with death anxiety, studies by Mackenbach et al. and Griffin et al. indicate that life expectancy and indicators such as healthcare access, mental health, family relationships, marital status, social participation, and support are important factors influencing death anxiety (Griffin et al., 2013; Mackenbach et al., 2013). Lockhart's study (2001) suggests that individuals with poorer mental and physical health may experience lower degrees of death anxiety, potentially due to a greater acceptance of mortality.

In the context of these findings, the correlation between exercise addiction and death anxiety in elderly individuals may be explained by the desire to prolong life and maintain health. This motivation could lead some individuals to engage in exercise to an addictive extent, seeking to reduce their anxiety about death through physical activity. Death anxiety may, therefore, act as a driving force for excessive exercise, as older adults seek to enhance their well-being and extend their lifespan.

One of the strengths of the study is its in-depth evaluation of the association between exercise addiction and health-related behaviors. This research contributes a unique perspective to the literature by providing an updated view of the link between exercise addiction and health-protective behaviors. It sheds light on how psychological factors, such as death anxiety, can influence exercise patterns in older adults, furthering the understanding of exercise addiction within this population. Exploring finer subgroups within the elderly, such as those with specific health conditions or social support levels, could further elucidate these associations, but aging-related declines in reading comprehension and patience may limit the feasibility of comprehensive assessments, potentially restricting subgroup analyses in this study.

Limitations

This study has several limitations. One limitation is the lack of standardization in the scales used to measure exercise addiction. Exercise addiction is a multidisciplinary phenomenon, and the content and focus of scales used by different researchers may vary. This can make it difficult to ensure consistency in measurement results and to compare them with widely accepted frameworks. While the scale used in this study effectively measured a specific dimension of

exercise addiction, it may have offered a limited perspective compared to scales used in other studies. The process of cultural adaptation of scales and their suitability for local contexts is another factor that should be considered. In the future, research could focus on comparative analysis of variable scales or the development of more comprehensive measurement tools.

The cross-sectional design of this study makes it difficult to determine a causal relationship between exercise addiction and psychological variables. Additionally, the questionnaires and scales used in the data collection process rely on participants' subjective self-reports, which may affect the accuracy of responses. The study did not consider the influence of cultural differences on exercise addiction, which limits the applicability of the findings to different cultural contexts.

Author contributions

Conception: .S., K.K., E.A.; Design: .S., K.K., G.A.; Data acquisition: K.K., G.A., E.A.; Data analysis: K.K., G.A., E.A.; Data interpretation: G.A., E.A.; Drafting of the manuscript: .S., E.A.; Critical revision of the manuscript: K.K., G.A. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Ethics Committee for Non-Interventional Health Sciences Research at Istanbul Okan University (Date: September 11, 2024, Decision/Protocol No: 180). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Asejeje, F. O., & Ogunro, O. B. (2024). Deciphering the mechanisms, biochemistry, physiology, and social habits in the process of aging. *Archives of Gerontology and Geriatrics Plus*, 1(1), 100003. [\[Crossref\]](#)
- Aydemir, ., Kirpınar, İ., Sati, T., Uykur, B., & Cengisiz, C. (2013). Reliability and validity of the Turkish version of the health anxiety inventory. *Nro Psikiyatri Arşivi*, 50(4), 325-331. [\[Crossref\]](#)
- Aydin, D., Baltacı, U. B., Erzen, E., Szabo, A., & Griffiths, M. D. (2023). The Turkish version of the exercise addiction inventory: Validity and reliability. *ADDICTA: The Turkish Journal on Addictions*, 10, 184-193. [\[Crossref\]](#)
- Baekeland, F. (1970). Exercise deprivation. Sleep and psychological reactions. *Archives of General Psychiatry*, 22(4), 365-369. [\[Crossref\]](#)
- Bengtson, V. L., Cuellar, J. B., & Ragan, P. K. (1977). Stratum contrasts and similarities in attitudes toward death. *Journal of Gerontology*, 32(1), 76-88. [\[Crossref\]](#)
- Billieux, J., Schimmenti, A., Khazaal, Y., Maurage, P., & Heeren, A. (2015). Are we overpathologizing everyday life? A tenable blueprint for behavioral addiction research. *Journal of Behavioral Addictions*, 4(3), 119-123. [\[Crossref\]](#)
- Bourgault-Fagnou, M. D., & Hadjistavropoulos, H. D. (2009). Understanding health anxiety among community dwelling seniors with varying degrees of frailty. *Aging and Mental Health*, 13(2), 226-237. [\[Crossref\]](#)
- Bueno-Antequera, J., Oviedo-Caro, M. A. N., Legaz-Arrese, A., Paris-Garcia, F., Guille N-Correas, R., Mungui A-Izquierdo, D., & Mayolas-Pi, C. (2022). Exercise addiction stability and health effects. A 6-month follow-up postcompetition study in amateur endurance cyclists. *Journal of Addiction Medicine*, 16(3), e140-e149. [\[Crossref\]](#)
- Chang, C. F., Lin, M. H., Wang, J., Fan, J. Y., Chou, L. N., & Chen, M. Y. (2013). The relationship between geriatric depression and health-promoting behaviors among community-dwelling seniors. *The Journal of Nursing Research: JNR*, 21(2), 75-82. [\[Crossref\]](#)
- Cho, D., & Kim, S. H. (2020). Health capability and psychological effects of regular exercise on adults: Middle-aged and older. *International Journal of Aging and Human Development*, 91(4), 520-537. [\[Crossref\]](#)
- Colledge, F., Buchner, U., Schmidt, A., Wiesbeck, G., Lang, U., Phse, U., Gerber, M., & Walter, M. (2021). Individuals at risk of exercise addiction have higher scores for depression, ADHD, and childhood trauma. *Frontiers in Sports and Active Living*, 3, 761844. [\[Crossref\]](#)
- Çavuşoğlu, Ç., & Demirkol, M. E. (2018). Yaşlılarda bağımlılık. *Bağımlılık Dergisi*, 19(3), 59-69.
- Dadfar, M., & Lester, D. (2015). Death concern and death obsession in Iranian nurses. *Psychological Reports*, 116(3), 704-709. [\[Crossref\]](#)
- Galloza, J., Castillo, B., & Micheo, W. (2017). Benefits of exercise in the older population. *Physical Medicine and Rehabilitation Clinics of North America*, 28(4), 659-669. [\[Crossref\]](#)
- Griffin, B., Loh, V., & Hesketh, B. (2013). A mental model of factors associated with subjective life expectancy. *Social Science & Medicine*, 82, 79-86. [\[Crossref\]](#)
- Hdzlik, I., Wojtyła, K., & Barg, M. (2024). When healthy habits turn harmful: A medical perspective on exercise addiction. *Quality in Sport*, 20, 54154. [\[Crossref\]](#)
- Hausenblas, H. A., & Giacobbi, P. R. (2004). Relationship between exercise dependence symptoms and personality. *Personality and Individual Differences*, 36(6), 1265-1273. [\[Crossref\]](#)

- Iverach, L., Menzies, R. G., & Menzies, R. E. (2014). Death anxiety and its role in psychopathology: Reviewing the status of a transdiagnostic construct. *Clinical Psychology Review, 34*(7), 580-593. [\[Crossref\]](#)
- Koechl, B., Unger, A., & Fischer, G. (2012). Age-related aspects of addiction. *Gerontology, 58*(6), 540-544. [\[Crossref\]](#)
- Lichtenstein, M. B., Nielsen, R. O., Gudex, C., Hinze, C. J., & Jørgensen, U. (2018). Exercise addiction is associated with emotional distress in injured and non-injured regular exercisers. *Addictive Behaviors Reports, 8*, 33-39. [\[Crossref\]](#)
- Lindesay, J., Stewart, R., & Bisla, J. (2012). Anxiety disorders in older people. *Reviews in Clinical Gerontology, 22*(3), 204-217. [\[Crossref\]](#)
- Lockhart, L. K., Bookwala, J., Fagerlin, A., Coppola, K. M., Ditto, P. H., Danks, J. H., & Smucker, W. D. (2001). Older adults' attitudes toward death: Links to perceptions of health and concerns about end-of-life issues. *Omega, 43*(4), 331-347. [\[Crossref\]](#)
- Mackenbach, J. P., Hu, Y., & Looman, C. W. N. (2013). Democratization and life expectancy in Europe, 1960-2008. *Social Science and Medicine, 93*, 166-175. [\[Crossref\]](#)
- Meyer, M., Sattler, I., Schilling, H., Lang, U. E., Schmidt, A., Colledge, F., & Walter, M. (2021). Mental disorders in individuals with exercise addiction-A cross-sectional study. *Frontiers in Psychiatry, 12*, 751550. [\[Crossref\]](#)
- Montorio, I., Nuevo, R., Márquez, M., Izal, M., & Losada, A. (2003). Characterization of worry according to severity of anxiety in elderly living in the community. *Aging and Mental Health, 7*(5), 334-341. [\[Crossref\]](#)
- Ödek, Ö., Savaş, M., & Zincir, H. (2022). Validity and reliability of the Turkish version of Health Protective Behavior Scale. *Journal of Basic and Clinical Health Sciences, 6*(1), Article 1. [\[Crossref\]](#)
- Petry, N. M. (2002). A comparison of young, middle-aged, and older adult treatment-seeking pathological gamblers. *Gerontologist, 42*(1), 92-99. [\[Crossref\]](#)
- Pinquart, M. (2001). Correlates of subjective health in older adults: A meta-analysis. *Psychology and Aging, 16*(3), 414-426. [\[Crossref\]](#)
- Poordad, S., Momeni, K., & Karami, J. (2019). Death anxiety and its relationship with social support and gratitude in older adults. *Iranian Journal of Ageing, 14*(1), 26-39.
- Qiu, Y., Fernández-García, B., Lehmann, H. I., Li, G., Kroemer, G., López-Otín, C., & Xiao, J. (2023). Exercise sustains the hallmarks of health. *Journal of Sport and Health Science, 12*(1), 8-35. [\[Crossref\]](#)
- Sabat, S., Sharma, S., Saini, P., Saxena, S., Sharma, A., & Rizvi, M. R. (2024). Comparing the effect of balance and coordination exercise on different platforms as on floor, Swiss ball & foam in geriatric population-A randomized control trial. *Aging Medicine and Healthcare, 15*(1), 28-35. [\[Crossref\]](#)
- Sarıkaya, Y., & Baloğlu, M. (2016). The development and psychometric properties of the Turkish death anxiety scale (TDAS). *Death Studies, 40*(7), 419-431. [\[Crossref\]](#)
- Sicilia, Á., Alcaraz-Ibáñez, M., Paterna, A., & Griffiths, M. D. (2022). A review of the components of problematic exercise in psychometric assessment instruments. *Frontiers in Public Health, 10*, 839902. [\[Crossref\]](#)
- Terry, A., Szabo, A., & Griffiths, M. (2004). The exercise addiction inventory: A new brief screening tool. *Addiction Research and Theory, 12*(5), Article 5. [\[Crossref\]](#)
- Yang, G., Tian, L., Wang, Y., Li, J., Qiu, P., Rao, S., & Kuang, W. (2022). Prevalence and relative factors of health anxiety of elders in community healthcare centers. *International Psychogeriatrics, 34*(8), 735-742. [\[Crossref\]](#)
- Zmijewski, C. F., & Howard, M. O. (2003). Exercise dependence and attitudes toward eating among young adults. *Eating Behaviors, 4*(2), 181-195. [\[Crossref\]](#)

The nexus of video gaming experiences: The associations among basic needs in games, real-life basic needs, well-being indicators, and problematic online gaming

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Abstract

Recent research highlights the vital roles of basic needs in video gaming experiences. Both need-supportive and need-frustrating video gaming experiences have theoretical and practical implications for real-life need satisfaction and frustration, and well-being outcomes. This study aimed to adapt the Basic Needs in Games Scale into Turkish, tested the psychometric properties of “gaming in general” and “gaming in a particular game” versions of the Turkish Basic Needs in Games Scale, and investigated the associations among the Basic Needs in Games Scale, problematic online gaming, life satisfaction, meaning in life (i.e., coherence, purpose, significance), and real-life basic psychological needs. This study recruited a sample of 247 Turkishspeaking participants who played at least one video game over the past 2 weeks. The results provided evidence for the structural validity of the Turkish Basic Needs in Games Scale versions, and demonstrated good reliability for the Basic Needs in Games Scale subscales. The findings indicated that indicators of need satisfaction and frustration in games were primarily associated with their real-life counterparts and showed complex associations with life satisfaction, meaning in life, and problematic online gaming. The implications for further research on basic needs in video games are discussed.

Keywords: basic needs in video games, meaning in life, need frustration, need satisfaction, problematic online gaming, well-being

Main points

- When studying player experiences in video games and their effects on mental health, need-satisfying and frustrating experiences (i.e., autonomy, competence, relatedness) play pivotal roles.
- The Basic Needs in Games Scale is a novel instrument for measuring need satisfaction and frustration in video games.
- The Turkish versions of the Basic Needs in Games Scale, considering particular or general gaming experiences, supported structural validity, demonstrated good reliability, and consistent psychometric properties across gender.
- Need satisfaction indicators in video games had predominantly positive associations with real-life need satisfaction indicators, meaning in life (i.e., coherence, purpose, significance), and well-being, and negative associations with problematic online gaming, while need frustration indicators had positive associations with real-life need frustration indicators and problematic online gaming.

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Introduction

Recent research has increasingly focused on player experiences in video games. Researchers have particularly paid attention to flow, presence, engagement, immersion, and joy in the gaming experiences of players when playing video games (Ballou et al., 2023). According to Statista (2024), there are 1.31 billion active video game players in 2024, equal to 16% of the world's population. It is estimated that there will be 1.47 billion video game players worldwide in 2027, equal to 17.7% of the world's population. The revenues from video games in a global scope currently correspond to \$455.27 billion in 2024. This estimation is envisioned to exceed \$625.64 billion in 2028 by a 37.42% growth. These statistics definitely indicate that video games have become so pervasive in people's lives that a huge amount of the human population engages in them.

The conceptualization and measurement of gaming experiences has gained increasing importance, particularly in educational and industrial contexts (Denisova et al., 2016). A large body of research has emphasized possible negative effects of video games such as aggression (Greitemeyer & Mügge, 2014), less academic achievement (Savić Tot et al., 2023), and worse physical health (Pelletier et al., 2020). In contrast, substantial research has demonstrated the positive effects of video games such as higher physical activity (LeBlanc et al., 2013), greater vitality, and less psychological distress (Formosa et al., 2022), and promoting well-being (Barr & Copeland-Stewart, 2022).

Player experiences play a pivotal role in the observed outcomes in video gaming as well as game content, time spent playing games, or game contexts (Sánchez et al., 2012). They have an important position in digital games research to understand how games affect players (Denisova et al., 2016). In this context, self-determination theory (SDT) and basic psychological needs theory have increasingly been applied in recent video game research (Ryan et al., 2006; Tamborini et al., 2011). Self-determination theory suggests that basic psychological needs (i.e., autonomy, competence, relatedness) serve as universal fundamental nutrients for healthy functioning. When these needs are satisfied, individuals have greater well-being and psychological health. However, when these are thwarted or frustrated, individuals may experience negative outcomes in well-being and go through greater psychological distress.

These basic needs have particularly been investigated in digital games in terms of motivation across genres, human-computer interaction, virtual reality, and problematic online gaming (POG) (Ballou, 2023; Ballou & Deterding, 2023; Ryan et al., 2006; Tamborini et al., 2011; Tyack & Mekler, 2020). A great deal of research has shown that when individuals' basic needs are satisfied, they have higher levels of autonomous motivation, better engagement, stronger resilience, and beneficial well-being outcomes (e.g., Allen & Anderson, 2018; Formosa et al., 2022; Ijaz et al., 2020; Johannes et al., 2021; Tamborini et al., 2011; Vella et al., 2015). In contrast, research has indicated that when individuals' basic needs are frustrated, they may experience an obsessive passion for games, spend more time in gaming (Mills et al., 2018a) and demonstrate

higher scores in problematic video gaming (Allen & Anderson, 2018; Mills et al., 2018b; Mills & Allen, 2020). Despite these findings, results present a more complex picture since some studies demonstrated that need satisfaction had weak positive associations with POG (e.g., Bender & Gentile, 2020; Formosa et al., 2022) and that need frustration had moderate positive associations with them (e.g., Kosa & Uysal, 2021).

Although previous research has underlined the measurement of basic psychological needs in video games, available instruments to measure need satisfaction and/or need frustration in video games have been criticized (e.g., Allen & Anderson, 2018; Kosa & Uysal, 2021, 2024). Ballou et al. (2023) argue that existing measures lack of including and effectively measuring need frustration, involving relatedness items in the contexts of single-player or multiplayer games, and demonstrating inadequate support for validity regarding various generality levels of video games. Thus, current measures of basic psychological needs assessment fail to capture the intended constructs of need satisfaction and frustration in video game contexts because of not including need frustration and taking on limited perspectives on basic needs, particularly concentrating on relatedness. Moreover, real-life measures of basic psychological needs are likely to be unsuitable for video game contexts (Kosa & Uysal, 2021).

To overcome these limitations and challenges, Ballou et al. (2023) developed the Basic Needs in Games Scale (BANGS), a measure of need satisfaction and frustration in video games based on SDT. The BANGS showed good structural validity and demonstrated a good model fit as well as longitudinal measurement invariance, criterion validity, and convergent validity. The final version of the BANGS included six three-item subscales for basic needs satisfaction and frustration (i.e., autonomy, competence, relatedness) in video games. The BANGS is based on the basic needs in games (BANG) model relying on SDT (Ballou & Deterding, 2023). The BANG suggests that SDT can better explain when and why games influence well-being and mental health, particularly in the following areas: (1) better engaging in games through causal modeling, (2) including need frustration, (3) studying different levels of generality, and (4) specifying negative and positive outcomes of compensation. The BANG particularly proposes that need satisfaction and frustration in games at the contextual level regarding gaming experiences in a particular game or in general will translate into player's need satisfaction and frustration at the global level (i.e., in life), supported by previous research (Allen, 2020; Allen & Anderson, 2018).

The present research aims to investigate the psychometric properties of the BANGS in Turkish considering basic needs in gaming experiences in general and in a particular context. The current research attempts to achieve the following goals: (1) to confirm the structural validity of the two versions of the BANGS, (2) to test the configural, metric, scalar, and strict invariances of the two versions of the BANGS across gender, (3) to evaluate reliability scores of the two versions of the BANGS, and (4) to explore the associations among the BANGS versions, POG, life satisfaction, meaning in life, and real-life basic psychological needs.

Material and Methods

Participants

We recruited a total of 251 Turkish-speaking participants. 247 university students were involved in the study as four participants did not meet the criteria (see Data Collection below). They were 63% female. Participants' ages ranged between 18 and 46 ($M = 21.70$; $SD = 3.58$). About 81% were undergraduate students, and 79% reported a medium level of subjective economic status. Common examples of video games reported by the participants included Mobile Legends, Valorant, PUBG, and much more.

Measures

Demographics. Demographic data included gender, education, subjective economic status, and marital status.

Basic Needs in Games Scale (Ballou et al., 2023): The BANGS measures the satisfaction and frustration of basic psychological needs in games. It includes six three-item subscales for autonomy, competence, and relatedness in games including items such as "I could make choices regarding how to play [X]," "I felt that I made progress while playing [X]," and "I felt that other players and/or characters in [X] cared about me." The BANGS is rated on a 7-point Likert scale from "1 = Strongly disagree" to "7 = Strongly agree." So, it includes 18 items in total (i.e., nine items for need satisfaction in games and 9 items for need frustration in games). The current research tested two versions of the BANGS in Turkish. The first version evaluated gaming experiences in general over the past 2 weeks, while the second version assessed gaming experiences in a particular game indicated by the participants over the past 2 weeks. The reliability scores of each BANGS version are provided in the Results section.

Satisfaction with Life Scale (SWLS) (Diener et al., 1985; Köker, 1991): The SWLS has five items such as "The conditions of my life are excellent" to evaluate a global judgment of satisfaction with life. The SWLS employs a 7-point Likert scale from "1 = Strongly disagree" to "7 = Strongly agree." The reliability score of the SWLS was as follows: SWLS ($\alpha = .88$).

Three Dimensional Meaning in Life Scale (3DM) (Martela & Steger, 2023; Subaşı, 2024): The 3DM encompasses three subscales (i.e., coherence, purpose, significance) having 11 items in total. Coherence (e.g., "I can make sense of my life") and purpose (e.g., "I am highly committed to certain core goals in my life") are four-item subscales, whereas significance (e.g., "My life is full of value") includes three items. The 3DM employs a 7-point Likert scale from "1 = Not at all true" to "7 = Very true." The reliability scores of the 3DM were as follows: coherence ($\alpha = .80$); purpose ($\alpha = .86$); significance ($\alpha = .88$).

Balanced Measure of Psychological Needs Scale (BMPN) (Sheldon & Hilpert, 2012; Kardas & Yalcin, 2018): The BMPN evaluates the satisfaction and frustration of each of basic psychological needs (i.e., autonomy, competence, relatedness)

through six three-item scales including items such as "I was successfully completing difficult tasks and projects," "I felt close and connected with other people who are important to me," "I was really doing what interests me." Each subscale employs a 7-point Likert scale from "1 = Strongly disagree" to "7 = Strongly agree." The reliability scores of the BMPN were as follows: autonomy satisfaction ($\alpha = .78$); autonomy frustration ($\alpha = .79$); competence satisfaction ($\alpha = .81$); competence frustration ($\alpha = .78$); relatedness satisfaction ($\alpha = .82$); relatedness frustration ($\alpha = .72$).

Problematic Online Gaming (Lemmens et al., 2009; Baysak et al., 2016): This measure assesses POG with seven three-item subscales (i.e., salience, tolerance, mood modification, relapse, withdrawal, conflict, and problems) including items such as "Have you felt addicted to a game?" This scale can also be calculated through a total of seven items in a shortened way. The present research used the seven-item version of the scale. The measure utilizes a 5-point Likert scale from "1 = never" to "5 = very often." The reliability score of the scale was as follows: POG ($\alpha = .89$).

Adaptation of the Turkish Basic Needs in Games Scale

The present research adhered to the double-translation method. Two PhD students in psychology and counseling psychology did the initial translation of the BANGS into Turkish. An expert in psychology, an expert in social work, and three specialists in Turkish language evaluated the translated items. Turkish language specialists assessed the translated items in terms of Turkish grammar and expression. The other experts evaluated the items with regard to measurement. The first two authors revised the items and sent the revised items for reverse translation. Following this step, two PhD students in psychology and social work translated this version of the items to English. Finally, two experts in psychology reviewed the latest version of the BANGS regarding measurement. The first two authors finalized the items and this version of the BANGS included two versions: basic psychological need satisfaction and frustration considering general gaming experiences and gaming experiences in a particular game. A pilot study was conducted for face validity. In the pilot study, 60 participants were recruited to test the finalized items. All subscales regarding both scales demonstrated adequate reliability from .80 to .91 except for the autonomy frustration subscale in both scales ranging from .68 to .74.

Data Collection

The present research was a cross-sectional study using convenience sampling. Inclusion criteria for taking part in the study were: being at least over 18 years old, being a student (e.g., preparatory, undergraduate, master's, or doctorate), having played at least one video game in the past 2 weeks, and providing informed consent. Participants were asked to indicate a game that they have played in the past 2 weeks on any of the following devices: smartphones, tablets, computers, or a device that they have been using for gaming.

Participants were free to choose what sort of game(s) they wanted to write down. Turkish validations of the scales were used. The present research collected data through a Google Forms link at the beginning of the second semester of the 2023-2024 academic year in Türkiye. The Commission for the Ethical Evaluation of Empirical Research Projects of the Department of Psychology at HSE University granted ethical approval to this study. The present research followed the Helsinki Declaration and its later amendments, and ethical guidelines (e.g., anonymity, confidentiality, and voluntariness).

Data Analysis

The current research utilized R language to perform the analyses. Missing values, outliers, and normality assumptions were assessed. No missing data or outliers were found. The BANGS items were sufficiently normally distributed considering the suggestion by Tabachnick and Fidell (2013) that skewness and kurtosis values are acceptable when they range between -1.5 and $+1.5$. As recommended by Kline (2015), the sample size was adequate as it was at least 200 participants.

First of all, descriptive statistics of the BANGS were provided along with their corrected item-total scores, and carried out confirmatory factor analyses (CFAs) for both versions of the BANGS to test their structural validity. Second, the measurement invariance of the BANGS across gender was analyzed. Third, the reliability scores of both BANGS scales were calculated. Finally, the associations among the BANGS scales, life satisfaction, meaning in life indicators, real-life basic psychological needs, and POG were analyzed.

The current research employed several criteria as fit indices in CFAs (Hu & Bentler, 1999; West et al., 2012): the chi-square, the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA), and the (standardized) root mean square residual (SRMR). The chi-squared/df values should be less than three to indicate good fit, five to demonstrate acceptable fit, and 10 to show marginal fit. The CFI value should be higher than .95 to indicate good fit, .90 to demonstrate acceptable fit, and .85 to show marginal fit. The TLI value should be higher than .95 to indicate good fit, .90 to demonstrate acceptable fit, and .85 to show marginal fit. The RMSEA should be less than or equal to .08 to indicate good fit, .10 to demonstrate acceptable fit, and .12 to show marginal fit. The SRMR should be less than or equal to .08 to indicate good fit, .10 to demonstrate acceptable fit, and .12 to show marginal fit.

Results

Preliminary Analyses

For the version of gaming experiences in general, the lowest and highest scores of the BANGS items' mean, standard deviation, skewness, and kurtosis respectively ranged from 2.51 to 5.54; from 1.51 to 2.02; from -1.17 to 1.10 ; from -1.23 to 0.88 . For the version of gaming experiences in a particular

game, the lowest and highest scores of the BANGS items' mean, standard deviation, skewness, and kurtosis respectively ranged from 2.44 to 5.67; from 1.49 to 2.12; from -1.21 to 1.07 ; from -1.35 to 1.00 . Consequently, multivariate normality was assumed for each version. The item-total correlation of the items of version of gaming experiences in general ranged from .32 to .81. The item-total correlation of the items of version of gaming experiences in a particular game ranged from .41 to .84, showing similarity in each version.

Factor Structure of the Basic Needs in Games Scale Versions

To evaluate the factor structures of both versions of the BANGS, the CFAs for one-factor, two-factor, and six-factor models were conducted. The CFAs were performed through the R lavaan package using the maximum likelihood estimator and standard error with full information maximum likelihood. No modifications were made and no item was removed. One-factor, two-factor, and six-factor solutions of the BANGS versions were tested to assess the best fit to the data, to evaluate whether need satisfaction and frustration constructs can explain the variance in the items, and to confirm whether the BANGS subscales are replicated in Turkish. The two-factor solution of the BANGS was tested to see whether need satisfaction and frustration including each need represent higher-order factors. As shown in Table 1, one-factor and two-factor solutions of both versions of the BANGS demonstrated poor fit indices. Six-factor solutions of both versions of the BANGS indicated excellent fit indices. The factor loadings of the version of gaming experiences in general ranged from .42 to .91. The factor loadings of the version of gaming experiences in a particular game ranged from .53 to .90.

Measurement Invariance of the Basic Needs in Games Scale Versions across Gender

To assess the configural, metric, scalar, and strict invariance of both versions of the BANGS, CFAs were performed across gender. As shown in Table 2, all types of invariance provided excellent or good fit indices for both versions of the BANGS, revealing consistent psychometric properties across gender in terms of the latent factor, factor loadings, metric equivalence, and residual variances (consider nesting the models in Table 2). The general version of the BANGS had slightly better fit indices than the particular version of the BANGS.

Reliability Scores of the Basic Needs in Games Scale Versions

To assess the reliability scores, Cronbach's alpha and McDonald's omega scores were calculated. As shown in

Table 1. Fit indices for confirmatory factor analysis of both versions of the basic needs in games scale

Model	X ²	df	X ² /df	CFI	TLI	SRMR	RMSEA
BANGS-General							
One-factor	1414.84	135	10.48	.39	.30	.19	.20
Two-factor	740.26	134	5.52	.71	.67	.12	.14
Six-factor	190.99	120	1.59	.97	.96	.05	.05
BANGS-Particular							
One-factor	1595.95	135	11.82	.46	.38	.19	.21
Two-factor	942.06	134	7.03	.70	.66	.13	.16
Six-factor	221.14	120	1.84	.96	.95	.04	.06

Note: BANGS = Basic Needs in Games Scale; CFI = Comparative fit index; df = Degree of freedom; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; TLI = Tucker–Lewis Index; X² = Chi-square.

Table 2. Measurement invariance of the basic needs in games scale across gender

Model	X ²	df	X ² /df	CFI	TLI	SRMR	RMSEA
BANGS-General							
Configural invariance	313.83	234	1.34	.96	.95	.06	.05
Metric invariance	325.39	246	1.32	.96	.95	.07	.05
Scalar invariance	339.50	264	1.29	.96	.96	.07	.05
Strict invariance	371.74	282	1.32	.96	.95	.07	.05
BANGS-Particular							
Configural invariance	391.76	234	1.67	.94	.93	.05	.07
Metric invariance	405.89	246	1.65	.94	.93	.06	.07
Scalar invariance	416.50	264	1.58	.94	.94	.06	.07
Strict invariance	463.05	282	1.64	.93	.93	.06	.07

Note: BANGS = Basic Needs in Games Scale; CFI = Comparative fit index; df = Degree of freedom; RMSEA = Root mean square error of approximation; SRMR = Standardized root mean square residual; TLI = Tucker–Lewis Index; X² = Chi-square.

Table 3, the majority of the subscales of both versions of the BANGS demonstrated good reliability, ranging from .81 to .91. Autonomy frustration in gaming experiences in general indicated questionable reliability, while showing acceptable reliability in the other version.

Table 3. Reliability scores of the basic needs in games scale

BANGS Subscale	Cronbach's Alpha	McDonald's Omega
G-Autonomy Satisfaction	.84	.84
G-Autonomy Frustration	.58	.60
G-Competence Satisfaction	.87	.88
G-Competence Frustration	.81	.81
G-Relatedness Satisfaction	.84	.85
G-Relatedness Frustration	.83	.83
S-Autonomy Satisfaction	.89	.89
S-Autonomy Frustration	.68	.71
S-Competence Satisfaction	.84	.85
S-Competence Frustration	.82	.82
S-Relatedness Satisfaction	.89	.89
S-Relatedness Frustration	.91	.91

Note: BANGS = Basic Needs in Games Scale; G = Video gaming experiences in general; S = Video gaming experiences in a particular game.

The Associations Among the Basic Needs in Games Scale, Problematic Online Gaming, Life Satisfaction, Meaning in Life, and Real-Life Basic Psychological Needs

To explore the associations among the variables, Pearson correlation analyses were carried out. As shown in Table 4, for the version of gaming experiences in general, autonomy satisfaction and competence satisfaction had weak or moderate positive associations with all of well-being, meaning in life, and real-life need satisfaction indicators. Relatedness satisfaction had a moderate positive association with POG and weak positive associations with real-life autonomy satisfaction and real-life competence satisfaction. Autonomy satisfaction had weak negative associations with POG, real-life competence frustration, and real-life relatedness frustration. Competence satisfaction had weak negative associations with real-life competence frustration and real-life relatedness frustration.

For the version of gaming experiences in general, autonomy frustration had a weak positive association with POG, while competence frustration and relatedness frustration had moderate positive associations with it. Autonomy frustration had weak positive associations with real-life autonomy frustration, real-life competence frustration, and real-

Table 4. The associations among the basic needs in games scale version of gaming experiences in general, real-life basic psychological needs, meaning in life indicators, and life satisfaction

	BANGS Subscales					
	GAS	GAF	GCS	GCF	GRS	GRF
AUS	0.38 ***	-0.03	0.38 ***	-0.1	0.20 **	-0.10
AUF	-0.01	0.17 **	-0.03	0.27 ***	0.07	0.21 ***
COS	0.36 ***	-0.06	0.33 ***	-0.12	0.13 *	-0.10
COF	-0.13 *	0.28 ***	-0.17 **	0.42 ***	0.08	0.39 ***
RES	0.40 ***	-0.11	0.39 ***	-0.32 ***	0.11	-0.41 ***
RES	-0.18 **	0.28 ***	-0.22 ***	0.40 ***	0.01	0.39 ***
SWLS	0.27 ***	-0.07	0.21 **	-0.06	0.11	-0.08
COH	0.35 ***	-0.05	0.26 ***	-0.16 *	0.08	-0.25 ***
PUR	0.25 ***	-0.05	0.24 ***	-0.12	0.06	-0.25 ***
SIG	0.23 ***	0.01	0.19 **	-0.11	0.07	-0.20 **
POG	-0.15 *	0.14 *	-0.08	0.52 ***	0.32 ***	0.52 ***

Note: AUS = Autonomy satisfaction; AUF = Autonomy frustration; COF = Competence frustration; COH = Coherence; COS = Competence satisfaction; GAF = Autonomy frustration in gaming experiences in general; GAS = Autonomy satisfaction in gaming experiences in general; GCF = Competence frustration in gaming experiences in general; GCS = Competence satisfaction in gaming experiences in general; GRF = Relatedness frustration in gaming experiences in general; GRS = Relatedness satisfaction in gaming experiences in general; POG = Problematic online gaming; PUR = Purpose; RES = Relatedness satisfaction; SIG = Significance; SWLS = Satisfaction with Life Scale.

* $p < .05$; ** $p < .01$; *** $p < .001$.

life relatedness frustration. Competence frustration and relatedness frustration had weak positive associations with real-life autonomy frustration, while having moderate positive associations with real-life competence frustration and real-life relatedness frustration. Competence frustration had a weak negative association with coherence, while having a moderate negative association with real-life relatedness satisfaction. Relatedness frustration had weak negative associations with coherence, purpose, and significance, while having a moderate negative association with real-life relatedness satisfaction.

As shown in Table 5, for the version of gaming experiences in a particular game, autonomy satisfaction had a weak negative association with POG, while relatedness satisfaction had a moderate positive association with it. Autonomy satisfaction and competence satisfaction had weak or moderate positive associations with all of well-being, meaning in life, and real-life need satisfaction indicators. Relatedness satisfaction had only a weak positive association with real-life autonomy satisfaction. Autonomy satisfaction and competence satisfaction had weak negative associations with real-life competence frustration and real-life relatedness frustration.

Table 5. The associations among the basic needs in games scale version of gaming experiences in a particular game, real-life basic psychological needs, meaning in life indicators, and life satisfaction

	BANGS Subscales					
	SAS	SAF	SCS	SCF	SRS	SRF
AUS	0.42 ***	-0.10	0.38 ***	-0.06	0.22 ***	-0.11
AUF	0.05	0.21 **	-0.02	0.25 ***	0.07	0.19 **
COS	0.39 ***	-0.16 **	0.33 ***	-0.12	0.10	-0.08
COF	-0.18 **	0.29 ***	-0.13 *	0.40 ***	0.11	0.42 ***
RES	0.44 ***	-0.25 ***	0.38 ***	-0.30 ***	0.03	-0.41 ***
RES	-0.20 **	0.34 ***	-0.23 ***	0.43 ***	0.04	0.36 ***
SWLS	0.22 ***	-0.10	0.23 ***	-0.10	0.08	-0.05
COH	0.31 ***	-0.16 *	0.23 ***	-0.18 ***	0.01	-0.19 **
PUR	0.23 ***	-0.15 *	0.24 ***	-0.20 **	-0.01	-0.24 ***
SIG	0.23 ***	-0.09	0.21 ***	-0.17 **	0.01	-0.17 **
POG	-0.14 *	0.31 ***	-0.05	0.51 ***	0.34 ***	0.52 ***

Note: AUF = Autonomy frustration; AUS = Autonomy satisfaction; COF = Competence frustration; COH = Coherence; COS = Competence satisfaction; RES = Relatedness satisfaction; SAF = Autonomy frustration in gaming experiences in a particular game; SAS = Autonomy satisfaction in gaming experiences in a particular game; SCF = Competence frustration in gaming experiences in a particular game; SCS = Competence satisfaction in gaming experiences in a particular game; SIG = Significance; SRF = Relatedness frustration in gaming experiences in a particular game; SRS = Relatedness satisfaction in gaming experiences in a particular game; SWLS = Satisfaction with Life Scale.

* $p < .05$; ** $p < .01$; *** $p < .001$.

For the version of gaming experiences in a particular game, autonomy frustration, competence frustration, and relatedness frustration had moderate positive associations with POG. Autonomy frustration, competence frustration, and relatedness frustration had weak positive associations with real-life autonomy frustration. They had moderate positive associations with real-life competence frustration and real-life relatedness frustration except for a weak positive association between autonomy frustration and real-life competence frustration. They had weak negative associations with coherence and purpose. Competence frustration and relatedness frustration had weak negative associations with significance. Autonomy frustration had weak negative associations with real-life competence satisfaction and real-life relatedness satisfaction. Competence frustration, and relatedness frustration had moderate negative associations with real-life relatedness satisfaction.

Discussion

The results provided strong evidence for the structural validity of the two versions of the BANGS. The measurement invariance analyses for the two versions of the BANGS fully supported the configural, metric, scalar, and strict invariances of the two versions of the BANGS across gender. The original version of the BANGS demonstrated partial support for the measurement invariance of the BANGS across game contexts and for the longitudinal invariance, but did not include any measurement invariance analysis across gender (Ballou et al., 2023). The results largely demonstrated good reliability scores of the BANGS. The reliability scores of each need satisfaction and need frustration subscale of the Turkish BANGS had slightly higher scores than the original BANGS subscales (Ballou et al., 2023). The only exception was that autonomy frustration in the version of gaming experiences in general had a low reliability, relatively less than the score in the original study. Overall, this study was the first non-English study to confirm the original structure of the BANGS and to evidence good reliability scores.

These findings in need satisfaction in games for each version mainly demonstrated positive associations with real-life psychological needs, life satisfaction, and meaning in life indicators (i.e., coherence, purpose, significance). These results were in line with prior research (e.g., Ijaz et al., 2020; Johannes et al., 2021; Ryan et al., 2006; Vella et al., 2015), while other research demonstrated negative or no associations with well-being indicators (e.g., Allen & Anderson, 2018; Formosa et al., 2022). The differences across the results may emerge from various factors such as sample characteristics, the usage of different measures of basic needs in video games and of well-being outcomes, or contextual variables that can affect video gaming experiences. These findings imply that feeling autonomous and/or competent in video gaming experiences may contribute to individuals' sense of coherence, purpose, and significance in life. Furthermore, experiencing need frustration in autonomy, competence, and relatedness in video gaming experiences may detract from individuals' sense of coherence, purpose, and significance in life.

The results indicated that each need satisfaction and frustration indicators in video game experiences in general or in a particular game related to their counterparts of real-life need satisfaction and frustration indicators except for relatedness satisfaction in both versions. In prior studies, researchers indicated that experiencing and satisfying basic needs in video games have positive outcomes on need satisfaction (e.g., Allen, 2020; Allen & Anderson, 2018; Ballou & Deterding, 2023), while Noon et al. (2024) did not replicate these associations for competence and relatedness satisfaction in video game experiences among adolescents. Overall, these findings largely provide support for the hypothesis of the BANG model that need satisfaction and frustration in games at the contextual level regarding gaming experiences in a particular game or in general may translate into player's need satisfaction and frustration at the global level (i.e., in life) (Ballou & Deterding, 2023).

The results demonstrated that each need satisfaction and frustration indicators in video game experiences in general or in a particular game related to POG except for relatedness satisfaction in both versions. These results were similar to previous research (e.g., Allen & Anderson, 2018; Mills et al., 2018a); however, several studies demonstrated that game need satisfaction had weak positive associations with POG and that need frustration had positive associations with it (e.g., Bender & Gentile, 2020; Formosa et al., 2022; Kosa & Uysal, 2021). As need frustration scores in both versions had higher associations with POG, need-frustrating experiences in video games may be a strong risk factor for developing and maintaining game-addictive behaviors.

The present versions of the Turkish BANGS employed university students in a cross-sectional design, which can limit the generalizability of the results and the speculation of causality. The present research relied on self-report measures, raising the possibility of bias such as social desirability. The present research did not evaluate the role of need satisfaction and frustration in daily life on POG as correlations among them were provided. The current study did not perform exploratory factor analysis (EFA) because of the theoretically sound structure of the BANGS, which may still require further attempts to evaluate it in Turkish through EFA in further studies. Another limitation was the relative imbalance of participants, which also serves as a caution when interpreting measurement invariance results across gender. In addition, the autonomy frustration subscale demonstrated poor reliability in both versions of the Turkish BANGS, which was the case in the original version. This can be due to several factors (e.g., cultural differences, conceptualization, or items that could be revised). Finally, participants were free to indicate any game(s) they wanted and evaluated their experiences in that/those. As games have different genres, they may differently affect players' gaming experiences in relation to their basic needs.

Future research should examine the psychometric properties of the BANGS in diverse populations such as divergent validity, particularly among teenagers and adults. Research should employ populations in which gender is balanced and

focus on revising the autonomy frustration subscale. Further research should investigate how different game genres can affect basic needs in video games. Additional research can also investigate the longitudinal and contextual invariance of the BANGS as in the original version and test other propositions of the BANG model. These studies can be performed through objectively tracked playtime. Future research can particularly focus on compensatory game selection, need-compensating gaming, and BANG. Research can investigate how to tap into the autonomy subscales in video games and strive to develop single-item versions of basic needs in video games.

In conclusion, the results of both versions of the BANGS demonstrate that the Turkish BANGS is a valid and reliable measure to assess BANG. This study highlights the importance of need-supportive and need-frustrating experiences in video games and their potential outcomes in real-life need satisfaction and well-being. The results suggest that need-supportive and need-frustrating experiences in video games may be instrumental in individuals' sense of coherence, purpose, and significance in life. As video games and gaming become more pervasive around the globe, identifying and improving healthy gaming experiences in the context of basic needs may warrant broader implications for individuals' well-being and mental health. Further research should explore the complexity of BANG and mental health outcomes across diverse cultural and demographic contexts.

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Author contributions

Conception: M.S.; Design: M.S., E.G.; Data acquisition: H.K., S.B.; Data interpretation: M.S., E.G., E.N.O.; Drafting of the manuscript: M.S.; Critical revision of the manuscript: E.G., H.K., S.B., E.N.O. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Ethical Evaluation of Empirical Research Projects of the Department of Psychology of the HSE University (Date: February 20, 2024). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Allen, J. J. (2020). *Gaming as psychologically nutritious: Does need satisfaction in video games contribute to daily well-being beyond need satisfaction in the real world?* [Doctoral thesis, Iowa State University]. Iowa State University Digital Repository. <https://dr.lib.iastate.edu/entities/publication/717c897b-f253-4281-8503-4424cbea2f4f>
- Allen, J. J., & Anderson, C. A. (2018). Satisfaction and frustration of basic psychological needs in the real world and in video games predict internet gaming disorder scores and well-being. *Computers in Human Behavior*, 84, 220-229. [\[Crossref\]](#)
- Ballou, N. (2023). *The basic needs in games (BANG) model of video games and mental health: Untangling the positive and negative effects of games with better science* [Doctoral dissertation, Queen Mary University of London]. Queen Mary University of London Repository. <https://qmro.qmul.ac.uk/xmlui/handle/123456789/93468>
- Ballou, N., Denisova, A., Ryan, R. M., Rigby, C. S., & Deterding, S. (2023). *The Basic Needs in Games Scale (BANGS): A new tool for investigating positive and negative video game experiences*. PsyArXiv. [\[Crossref\]](#)
- Ballou, N., & Deterding, S. (2023). 'I Just Wanted to Get it Over and Done With': A grounded theory of psychological need frustration in video games. *Proceedings of the ACM on Human-Computer Interaction*, 7(CHI PLAY), 217-236. [\[Crossref\]](#)
- Barr, M., & Copeland-Stewart, A. (2022). Playing video games during the COVID-19 pandemic and effects on players' well-being. *Games and Culture*, 17(1), 122-139. [\[Crossref\]](#)
- Baysak, E., Kaya, F. D., Dalgat, I., & Candansayar, S. (2016). Online game addiction in a sample from Turkey: Development and validation of the Turkish version of game addiction scale. *Klinik Psikofarmakoloji Bülteni-Bulletin of Clinical Psychopharmacology*, 26(1), 21-31. [\[Crossref\]](#)
- Bender, P. K., & Gentile, D. A. (2020). Internet gaming disorder: Relations between needs satisfaction in-game and in life in general. *Psychology of Popular Media*, 9(2), 266-278. [\[Crossref\]](#)
- Denisova, A., Nordin, A. I., & Cairns, P. (2016). The convergence of player experience questionnaires. In *Proceedings of the 2016 annual symposium on computer-human interaction in play* (pp. 33-37). ACM. [\[Crossref\]](#)

- Diener, E. D., Emmons, R. A., Larsen, R. J., & Griffin, S. (1985). The satisfaction with life scale. *Journal of Personality Assessment*, 49(1), 71-75. [\[Crossref\]](#)
- Formosa, J., Johnson, D., Türkay, S., & Mandryk, R. L. (2022). Need satisfaction, passion and wellbeing effects of videogame play prior to and during the COVID-19 pandemic. *Computers in Human Behavior*, 131, 107232. [\[Crossref\]](#)
- Greitemeyer, T., & Mügge, D. O. (2014). Video games do affect social outcomes: A meta-analytic review of the effects of violent and prosocial video game play. *Personality and Social Psychology Bulletin*, 40(5), 578-589. [\[Crossref\]](#)
- Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1-55. [\[Crossref\]](#)
- Pelletier, V. H., Lessard, A., Piché, F., Tétreau, C., & Descarreaux, M. (2020). Video games and their associations with physical health: A scoping review. *BMJ Open Sport and Exercise Medicine*, 6(1), e000832. [\[Crossref\]](#)
- Ijaz, K., Ahmadpour, N., Wang, Y., & Calvo, R. A. (2020). Player experience of needs satisfaction (PENS) in an immersive virtual reality exercise platform describes motivation and enjoyment. *International Journal of Human-Computer Interaction*, 36(13), 1195-1204. [\[Crossref\]](#)
- Johannes, N., Vuorre, M., & Przybylski, A. K. (2021). Video game play is positively correlated with well-being. *Royal Society Open Science*, 8(2), 202049. [\[Crossref\]](#)
- Kardas, F., & Yalcin, I. (2018). An adaptation study of the balanced measure of psychological needs (BMPN) scale to Turkish culture. *Cukurova University Faculty of Education Journal*, 47(2), 357-383. [\[Crossref\]](#)
- Kline, R. B. (2015). *Principles and practice of structural equation modeling*. The Guilford Press.
- Kosa, M., & Uysal, A. (2021). Need frustration in online video games. *Behaviour and Information Technology*, 41(1), 1-12. [\[Crossref\]](#)
- Kosa, M., & Uysal, A. (2024). Exploration of novelty as part of the player experience of need satisfaction in games. *Interacting with Computers*, iwae006. [\[Crossref\]](#)
- Köker, S. (1991). *Normal ve sorunlu ergenlerin yaşam doyumu düzeyinin karşılaştırılması* (Thesis No. 16802) [Master's thesis, Ankara University]. Council of Higher Education National Thesis Center.
- LeBlanc, A. G., Chaput, J. P., McFarlane, A., Colley, R. C., Thivel, D., Biddle, S. J. H., Maddison, R., Leatherdale, S. T., & Tremblay, M. S. (2013). Active video games and health indicators in children and youth: A systematic review. *PLoS One*, 8(6), e65351. [\[Crossref\]](#)
- Lemmens, J. S., Valkenburg, P. M., & Peter, J. (2009). Development and validation of a game addiction scale for adolescents. *Media Psychology*, 12(1), 77-95. [\[Crossref\]](#)
- Martela, F., & Steger, M. F. (2023). The role of significance relative to the other dimensions of meaning in life—an examination utilizing the three dimensional meaning in life scale (3DM). *Journal of Positive Psychology*, 18(4), 606-626. [\[Crossref\]](#)
- Mills, D. J., & Allen, J. J. (2020). Self-determination theory, internet gaming disorder, and the mediating role of self-control. *Computers in Human Behavior*, 105, 106209. [\[Crossref\]](#)
- Mills, D. J., Milyavskaya, M., Heath, N. L., & Derevensky, J. L. (2018a). Gaming motivation and problematic video gaming: The role of needs frustration. *European Journal of Social Psychology*, 48(4), 551-559. [\[Crossref\]](#)
- Mills, D. J., Milyavskaya, M., Mettler, J., Heath, N. L., & Derevensky, J. L. (2018b). How do passion for video games and needs frustration explain time spent gaming?. *British Journal of Social Psychology*, 57(2), 461-481. [\[Crossref\]](#)
- Noon, E. J., Carbone, L., Swinnen, B., & Vandenbosch, L. (2024). Adolescents' videogame play, need satisfaction, and self-esteem: A self-determination perspective. *Current Psychology*, 43(24), 21192-21207. [\[Crossref\]](#)
- Ryan, R. M., Rigby, C. S., & Przybylski, A. (2006). The motivational pull of video games: A self-determination theory approach. *Motivation and Emotion*, 30(4), 344-360. [\[Crossref\]](#)
- Sánchez, J. L. G., Vela, F. L. G., Simarro, F. M., & Padilla-Zea, N. (2012). Playability: Analysing user experience in video games. *Behaviour and Information Technology*, 31(10), 1033-1054. [\[Crossref\]](#)
- Savić Tot, T., Adžić, S., Tot, V., Aleksić, M., & Zakić, N. (2023). The impact of time devoted to video games on student achievement. *Education and Information Technologies*, 28(5), 5921-5944. [\[Crossref\]](#)
- Sheldon, K. M., & Hilpert, J. C. (2012). The balanced measure of psychological needs (BMPN) scale: An alternative domain general measure of need satisfaction. *Motivation and Emotion*, 36(4), 439-451. [\[Crossref\]](#)
- Statista. (2024). *Number of video gamers worldwide 2017-2027*. <https://www.statista.com/statistics/748044/number-video-gamers-world/#statisticContainer>
- Subaşı, M. (2024). Psychometric properties of the three dimensional meaning in life scale (3DM) among Turkish-speaking adults. *Türk Psikolojik Danışma ve Rehberlik Dergisi*, 14(75), 524-537. [\[Crossref\]](#)
- Tabachnick, B. G., & Fidell, L. S. (2013). *Using multivariate statistics*. Pearson.
- Tamborini, R., Grizzard, M., Bowman, N. D., Reinecke, L., Lewis, R. J., & Eden, A. (2011). Media enjoyment as need satisfaction: The contribution of hedonic and nonhedonic needs. *Journal of Communication*, 61(6), 1025-1042. [\[Crossref\]](#)
- Tyack, A., & Mekler, E. D. (2020). Self-determination theory in HCI games research - Current uses and open questions. In *Proceedings of the 2020 CHI Conference on Human Factors in Computing Systems (CHI '20)* (pp. 1-22). Association for Computing Machinery. [\[Crossref\]](#)
- Vella, K., Johnson, D., & Hides, L. (2015). Playing alone, playing with others: Differences in player experience and indicators of wellbeing. In *Proceedings of the 2015 annual symposium on computer-human interaction in play* (pp. 3-12). ACM. [\[Crossref\]](#)
- West, S. G., Taylor, A. B., & Wei, W. (2012). Model fit and model selection in structural equation modeling. In R. H. Hoyle (Ed.), *Handbook of structural equation modeling* (pp. 209-231). Guilford Press.

Nomophobia and psychological well-being: Chain mediating role of social network sites addiction and doomscrolling

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Abstract

The integration of mobile phones into everyday life has become unavoidable, shifting lifestyles across generations. Most likely, emerging adults suffer from repercussions caused by their dependence on smartphones and exposure to social networking sites, potentially associated with adverse outcomes for their mental health. This study investigated the mediating roles of social network sites addiction and doomscrolling within the interaction between nomophobia and the psychological well-being of emerging adults, utilizing a theoretical model grounded in the transactional model of stress. A cross-sectional study was conducted with 399 college students aged 18–24 in Tamil Nadu, India. The data analysis involved the Pearson correlation coefficient and structural equation modeling to examine the mediating roles of social network sites addiction and doomscrolling. It was observed that there was a positive link between nomophobia, social network sites addiction, and doomscrolling and a negative correlation between these factors and psychological well-being. Moreover, the results revealed that social network sites addiction and doomscrolling fully mediated the relationship between nomophobia and psychological well-being. The study recommends that college administrators, teachers, behaviorists, and researchers employ acceptance commitment therapy, cognitive behavioral therapy, and mindfulness to help individuals manage smartphone use, reduce nomophobia, and adopt healthier online habits for better well-being.

Keywords: doomscrolling, nomophobia, psychological well-being, social network sites addiction

Main points

- With the continuous increase in the penetration of smartphones in India, there is indeed a dearth of literature available on the psychological effects of nomophobia (NMP) and maladaptive online behaviors in emerging adults.
- The results showed that the individuals with higher levels of NMP exhibited more significant social network sites addiction and doomscrolling, which negatively impacted their psychological well-being.
- Applying the transactional model of stress and coping, social network sites addiction and doomscrolling moderate the relationship between NMP and well-being.
- These findings highlight the need for interventions aimed at educators, mental health professionals, and college administrators to address smartphone dependency and foster healthier online habits.
- Findings may guide efforts in developing programs such as Mindfulness-Based Interventions and Cognitive Behavioral Therapy to address NMP and its impact on well-being.

Introduction

New technologies have changed the way people live, work, and communicate with each other, and mobile gadgets have become essential instruments in the modern world. In this context, it is always important to evaluate how technology has changed society (Nawaz, 2023). As a result of the enhanced adoption of mobile devices as a habit, people spend part of their time on smartphones (Kim et al., 2024). Projections in

2023 revealed that the rate of smartphone dependency in India was more than one billion and would rise to 1.55 billion in 2040. Moreover, globally, the estimated smartphone user population is expected to reach approximately 7.7 billion by 2027 (Statista, 2023). Smartphone ownership remains notably high among the 18-29 age group, primarily consisting of students (Amez & Baert, 2020). However, the escalating use of these devices can fuel anxiety, known as “nomophobia” (NMP), where individuals fear being without their phones (Yildirim &

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Correia, 2015), resulting in discomfort and nervousness when detached from the device due to intermittent reception or a drained battery. It was ascertained that 66% of smartphone users are afflicted with NMP (Yildirim & Correia, 2015).

Although King et al. (2010) initially explored NMP, characterizing it as a hallmark ailment of the 21st century, it has only recently emerged as a central focus of intense research scrutiny, leading Humood et al. (2021) to conduct a landmark meta-analysis, revealing that approximately 21% of adults experience severe NMP. In addition, Tuco et al. (2023), in their in-depth review of 28 cross-sectional studies in nine countries, concluded that NMP is highly prevalent in university students. Their studies confirmed that 25% of the patients had mild NMP, more than 50% moderate NMP, and less than 20% severe NMP. Subsequently, Jahrami et al. (2023) conducted a meta-analysis with 20 articles from 10 countries from 2008 to 2022. The study showed that NMP leads to enhanced anxiety, depression, sleep disorders, poor academic performance, attention deficits, and impaired coping strategies in these vulnerable populations. Furthermore, an Indian study among students aged 20-23 showed that 15.5% suffered from mild NMP, 67.2% faced moderate NMP, and 17.3% suffered from severe NMP (Bartwal & Nath, 2020). Given its ubiquitous presence in modern life, it is crucial to understand how it impacts individuals' psychological well-being (PWB).

Psychological well-being is described by Diener et al. (2010) as a multi-factorial concept that encompasses aspects such as purpose in life, autonomy, mastery, and self-acceptance. This state leads to better and happier health and quality of human lives. The PWB is important among emerging adults because this stage is characterized by high anxiety and low PWB resulting from adaptation to new learning environments and increased academic demands (Canero Perez, 2019). Though a strong PWB enhances resilience, fosters personal growth, and contributes to a fulfilling college experience (Ryff, 1989), students vulnerable to NMP experience a decline in their PWB and an increase in academic stress (Bülbüloğlu et al., 2020). Although previous studies have consistently reported a negative correlation between NMP and PWB (Bülbüloğlu et al., 2020; Wibowo & Safaria, 2025), limited attention has been given to the mediating factors that may explain this relationship, highlighting a critical gap in the literature. This gap is particularly concerning, as college students heavily engaged with digital technology (Amez & Baert, 2020) are increasingly at risk of maladaptive behaviors (Tuco et al., 2023). The present study examines the role of negative coping strategies, specifically social network sites addiction (SNSA) and doomscrolling, as potential mediators between NMP and PWB among emerging adults.

Social networking sites, as virtual communities, can lead to addiction through user interactions and connections. Studies indicated that excessive SNSA causes different negative impacts on mood status, such as anxiety, stress, and depression (Hussain & Griffiths, 2018), as well as a higher risk of insomnia (Lin et al., 2021). Further, doomscrolling, described as the habit of repeatedly scrolling through distressing or negative digital news or online news websites, has been identified by

research as often leading to increased anxiety, stress, and harm to mental well-being (Sharma et al., 2022). The previous studies have individually explored relationships between different aspects of NMP and PWB (Bülbüloğlu et al., 2020), as well as the links between doomscrolling and PWB (Satici et al., 2022; Shabahang et al., 2023; Sharma et al., 2022; Taskin et al., 2024), social network sites use and PWB (Dolapoğlu et al., 2025). The findings consistently display a negative correlation between these variables, indicating that increased engagement in these activities is linked to lower levels of PWB. Hylkilä et al. (2024) undertook a recent in-depth review of 21 studies showing an inverse relationship between problematic social networking site use and various aspects of social well-being, including social relationships, parasocial relationships, and social media anxiety, underscoring the potential negative outcomes of excessive social networking on young adults. In addition, SNSA mediates the relationship between social and technology overload and PWB (Choi & Lim, 2016). Research has established a positive relationship between social media addiction and doomscrolling (Turk-Kurtça, 2025), indicating that social media addiction findings could help explain SNSA, given shared social networking elements between websites. Research has established independent relationships between SNSA and doomscrolling and enhanced psychological distress. However, few studies have examined how NMP interacts with SNSA in greater depth (Al-Mamun et al., 2022; Maftai & Pătrăușanu, 2024). A clear research gap remains in understanding how NMP, SNSA, and doomscrolling collectively influence PWB. Although these factors have been studied separately, little is known about how they interact to affect the PWB of emerging adults. To develop a deeper insight into digital dependence, it is essential to examine the role of NMP and the potential mediating roles of SNSA and doomscrolling on PWB. Examining NMP at various points helps explain its multidimensional nature while determining the interventions that could minimize its adverse effects on human existence. As this is a relatively new area of research, the existing empirical evidence lacks a strong foundation for establishing mediation effects. While prior studies have identified associations among the variables examined, there is currently no research specifically investigating the mediating roles of SNSA and doomscrolling in the relationship between NMP and PWB. The present study explores these mediating mechanisms to address this gap, thereby contributing to a deeper understanding of how NMP may influence PWB through SNSA and doomscrolling.

Theoretical Background

Turel and Serenko (2012) proposed three models, the cognitive-behavioral model, the social skills model, and the socio-cognitive model, to explain how maladaptive social network site use develops, mainly when individuals use social media to manage distress, especially those with limited offline social skills (Xu & Tan, 2012). Further, Choi and Lim (2016) employed cognitive load theory, the theory of information overload, and human interruption theory to explain how overload from digital environments can lead to mental fatigue, reduced focus, and impaired well-being. While these theories illuminate the mechanics of overload and its effects, they

fail to address how individuals appraise and cope with such stressors.

To address this limitation, the transactional model of stress and coping developed by Lazarus and Folkman (1984) is adopted as the central framework in this study. The transactional model of stress and coping focuses on the depth of distress encountered with a primary and secondary appraisal of the stimulus (Lazarus & Folkman, 1984). Primary appraisal comprises the initial assessment of the stressor, whereas secondary appraisal is the ability to manage the stressor. Distress occurs when stressor demands exceed coping resources, but is reduced when resources surpass the stressor's impact (Lazarus & Folkman, 1984). Unlike other theories, the transactional model of stress and coping is particularly suitable for this study because it accounts for the subjective nature of stress appraisal, making it highly relevant to understand how individuals perceive and react to smartphone-related stressors such as NMP.

Nomophobia and Psychological Well-Being

Nomophobia represents a significant primary stressor in the transactional model of stress and coping. As individuals experience high levels of NMP, they perceive their environment as increasingly threatening, negatively impacting their PWB. Previous research supports this relationship, demonstrating that increased NMP is associated with reduced PWB (Bülbüloğlu et al., 2020). Additionally, Wibowo and Safaria (2025) empirically established that NMP is a significant predictor of PWB. To confirm the result, the following hypothesis is suggested:

Hypothesis 1: NMP is negatively associated with PWB of emerging adults.

Nomophobia, Social Network Sites Addiction, and Doomscrolling

Individuals with a high degree of NMP may fall back on excessive engagement with social networking sites as a way to alleviate their anxiety and stress. It causes more severe addiction to social media platforms since people want to run away from the problems they face in their daily lives (Can & Kaya, 2016). Empirical studies have shown that NMP positively correlates with SNSA (Al-Mamun et al., 2023; Maftei & Pătrăușanu, 2024; Dolapoğlu et al., 2025). The main elements of NMP include stress and anxiety (Yildirim & Correia, 2015), which drive people to use ineffective coping behaviors like prolonged smartphone use along with information-seeking habits (Davey & Davey, 2014). Research reveals that individuals with problematic social media habits and those who consume news excessively show signs of compulsive online activity because anxiety makes them seek reassurance (Satici et al., 2023; Sharma et al., 2022), revealing the presence of doomscrolling. Although no direct studies have linked NMP and doomscrolling, it is plausible that individuals with high levels of NMP may engage in doomscrolling as a coping mechanism for distress, potentially worsening its impact on PWB. Furthermore, while NMP and SNSA are

positively correlated (Al-Mamun et al., 2022; Dolapoğlu et al., 2025; Maftei & Pătrăușanu, 2024), no predictive relationship has been established. In light of the reviewed studies on NMP, SNSA, and doomscrolling, the following hypotheses are articulated:

Hypothesis 2: NMP is positively associated with SNSA among emerging adults.

Hypothesis 3: NMP is positively associated with doomscrolling among emerging adults.

Social Network Sites Addiction, Doomscrolling, and Psychological Well-Being

Individuals engaged constantly in social media may experience a decline in PWB due to the negative impact of constant online engagement, such as social comparison and feelings of inadequacy. This addiction may also diminish meaningful face-to-face communication, leaving individuals feeling more worried and isolated from real life. Studies revealed that social media addiction diminishes PWB (Choi & Lim, 2016; Hylkilä et al., 2024; Kuss & Griffiths, 2011; Utz & Breuer, 2017). Similarly, due to constant exposure to unpleasant information, doomscrolling can reduce PWB among individuals. Continuous contact with adverse news and information can intensify depressive feelings and anxiety, which, in turn, reduce PWB (Satici et al., 2022). Evidence suggests that doomscrolling is a negative predictor of PWB (Satici et al., 2023; Taskin et al., 2024). Kuss and Griffiths (2011) highlight that SNSA is associated with negative consequences, including reduced social participation, poor academic performance, and relationship issues, which can predict a decline in PWB. Given these attributes, the following hypotheses are proposed:

Hypothesis 4: SNSA is negatively associated with PWB of emerging adults.

Hypothesis 5: Doomscrolling is negatively associated with PWB of emerging adults.

Social Network Sites Addiction and Doomscrolling

Social network sites addiction can also influence doomscrolling behaviors. As individuals become increasingly addicted to social media, they may spend more time engaging with distressing content online, leading to heightened doomscrolling. Prior research suggests that individuals with high SNSA levels demonstrate compulsive engagement with distressing online content, which may contribute to heightened emotional exhaustion and psychological distress (Satici et al., 2023). Although studies (Satici et al., 2023; Turk-Kurtça, 2025) have explored the relationship between SNSA and doomscrolling, they have not examined whether one predicts the other. Considering these findings, the following hypothesis is proposed:

Hypothesis 6: SNSA is positively associated with doomscrolling among emerging adults.

The Mediating and Chain Mediating Roles of Social Network Sites Addiction and Doomscrolling

Drawing from the transactional model of stress and coping (Lazarus & Folkman, 1984), NMP can be understood as a psychological stressor that triggers maladaptive coping strategies such as SNSA and doomscrolling. While these behaviors may initially appear to reduce anxiety or maintain social connection, they often contribute to a decline in PWB. Additionally, the Compensatory Internet Use Theory (Kardefelt-Winther, 2014) and the Uses and Gratifications Theory (Katz et al., 1973) offer further insight by framing SNSA and doomscrolling as coping mechanisms that individuals turn to when trying to manage the emotional discomfort brought on by NMP. These theoretical frameworks collectively support that SNSA and doomscrolling may serve as mediators, both individually and sequentially, in the relationship between NMP and PWB among emerging adults.

In this context, SNSA is proposed to act as a mediator through which the adverse effects of NMP are transferred, ultimately leading to reduced PWB. Individuals with high levels of NMP may increase their engagement with social networking platforms, which can escalate into addictive patterns and impair PWB (Choi & Lim, 2016). Similarly, doomscrolling is expected to mediate the link between NMP and PWB, as people with high NMP may turn to constant scrolling through negative online content, which worsens their PWB. These coping behaviors, SNSA and doomscrolling, can also work together in a sequence. That is, high NMP may lead to SNSA, which then increases the likelihood of doomscrolling, further raising emotional distress and reducing PWB. The mediating role of SNSA, doomscrolling, or their combined effect as chain mediators in the relationship between NMP and PWB has not been tested previously. Based on this framework, the following hypotheses are proposed:

Hypothesis 7: SNSA mediates the relationship between NMP and PWB of emerging adults.

Hypothesis 8: Doomscrolling mediates the relationship between NMP and PWB of emerging adults.

Hypothesis 9: SNSA and doomscrolling act as a chain mediator in the connection between NMP and PWB of emerging adults.

Within the transactional model of stress and coping framework, high NMP can increase stress due to heightened sensitivity to stressors and limited coping resources. The SNSA and doomscrolling may further exacerbate this by intensifying the perception of resource depletion, negatively impacting PWB. This study aims to explore how NMP affects well-being through the chain mediating effects of SNSA and doomscrolling in emerging adults. Figure 1 displays the conceptual framework anchored in the study's hypotheses.

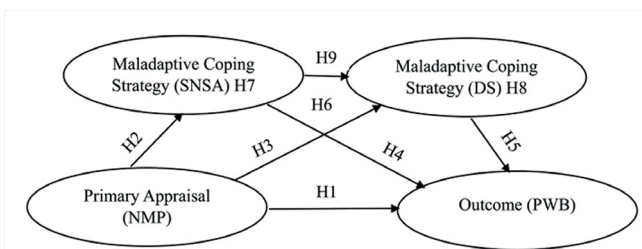


Figure 1. Proposed conceptual framework

Note. DS = doomscrolling; NMP = nomophobia; PWB = psychological well-being; SNSA = social network sites addiction.

Material and Methods

Participants/Sample

Participants were selected based on their enrollment in college, their age between 18 and 24 years, and their smartphone ownership. A total of 423 questionnaires were administered to college students (both undergraduate and postgraduate) over about three weeks. The final analysis encompassed 399 respondents whose data were deemed complete and suitable for inclusion after the exclusion of cases with missing values.

Ethical Committee Approval

Ethics Committee of University of Periyar approved the research proposal No. PU/EC/010/2024, presented on October 25, 2024. The study adhered to the Declaration of Helsinki, with ethical approval obtained (Approval Number: PU/001/IECRHS/2024-11; Date: November 8, 2024).

Sampling and Sample Procedures

A cross-sectional study was utilized to gather data via a questionnaire-based survey. A convenience sampling method was used, taking advantage of the accessibility and proximity of these institutions. Preliminary information regarding the study was effectively disseminated to the principal, faculty members, and students, and consent was meticulously secured from every participant. A good rapport was established with the students, and clear instructions were provided on how to complete the questionnaires. Students were assured that their responses would be kept confidential and would not affect their academic standing. Questionnaires were administered individually in 20- to 30-minute sessions, with groups of 30-40 students at a time.

Instruments

This study utilized four self-administered questionnaires to assess NMP, SNSA, doomscrolling, and PWB. The NMP questionnaire, devised by Yildirim and Correia (2015), comprises 20 items, such as "I would feel uncomfortable without constant access to information through my

smartphone,” and measures four dimensions: inability to communicate, loss of connectedness, inability to access information, and surrendering convenience. Participants rated each item on a 7-point Likert scale, with scores ranging from 20 to 140. Higher scores indicated more severe NMP, categorized as absent (20), mild (21-60), moderate (61-100), or severe (≥ 100). The internal consistency of the scale in the research, as shown by Cronbach’s α , was 0.934.

The SNSA scale, adapted from Koc and Gulyagci (2013) and modified by Choi and Lim (2016), consisted of six items such as “I have difficulties in focusing on my study or work due to social network sites use” and “I lose sleep over spending more time on these social network sites.” Respondents evaluated each statement using a scale ranging from 1 to 7. Higher scores indicated higher levels of SNSA. The SNSA scale demonstrated strong internal consistency with a Cronbach’s α of 0.869.

The doomscrolling questionnaire, developed by Sharma et al. (2022), comprised 15 items, such as “I lose track of time when I read bad news on social media.” Respondents evaluated items on a 7-point Likert scale, where higher scores signified greater doomscrolling. A Cronbach’s α of 0.944 indicated strong internal consistency for the scale.

Diener et al.’s (2010) Flourishing Scale (FS) measures PWB using eight items, including “I lead a purposeful and meaningful life.” Each item was rated by participants on a 7-point Likert scale, with higher scores representing greater PWB. The FS exhibited high internal consistency in the sample, evidenced by a Cronbach’s α of 0.909.

Data Analysis

Prior to analysis, rigorous data checks were conducted to assess normality, identify outliers, and manage any missing values. These preliminary steps were executed using Statistical Package for the Social Sciences (SPSS) version 21.0 (IBM SPSS Corp.; Armonk, NY, USA). After data preparation, Pearson correlation coefficients were computed to identify potential relationships among variables. Moreover, SEM was used to test the mediating effects of SNSA and doomscrolling on the link between NMP and PW. This analytical approach was implemented using Amos version 23.0.

Results

Preliminary Analysis

This study employed Harman’s single-factor test (Collier, 2020) in SPSS to assess potential common method bias (CMB). The results revealed that a single factor explained 31.821% of the total variance, falling short of the 40% threshold (Podsakoff et al., 2003), suggesting minimal CMB concerns. A collinearity test was also performed with PWB as the outcome variable and NMP, SNSA, and doomscrolling as the predictors. The variance inflation factors values were 2.137, 2.310, and 1.270, indicating no significant issues with multicollinearity. Furthermore, the normality test and bivariate correlations were calculated for all variables under analysis. The data’s adherence to normality was assessed by calculating skewness and kurtosis values. The results in Table 1 displayed that both skewness and kurtosis fell within the acceptable limits of -2 to $+2$ and -7 to $+7$, respectively, indicating normal distribution (Hair et al., 2023). Added to that, the Pearson correlation coefficients denoted a significant negative link between NMP and PWB ($r = -0.243, p = .001$), SNSA and PWB ($r = -0.365, p = .001$), as well as doomscrolling and PWB ($r = -0.524, p = .001$). Additionally, a positive correlation existed between NMP and SNSA ($r = 0.727, p = .001$), NMP and doomscrolling ($r = 0.379, p = .001$), and between SNSA and doomscrolling ($r = 0.456, p = .001$).

Reliability and Validity

Confirmatory factor analysis (CFA) was conducted for each scale. Table 2 presents the results, including convergent and discriminant validity, reliability, model fit indices, and factor loadings. The CFA was executed to examine the scale’s structure. Fit indices were scrutinized to investigate the CFA model’s adequacy. The results showed a satisfactory fit: $\chi^2 = 1.442$ ($df = 1106, p = .001$), CFI = 0.957, TLI = 0.954, SRMR = 0.0383, and RMSEA = 0.033 (Kline, 2016; Hair et al., 2023). Factor loadings ranged from 0.617 to 0.846, demonstrating strong item relationships with their respective factors. Convergent validity was evaluated using factor analysis, composite reliability (CR), and average variance extracted (AVE). As depicted in Table 2, all latent variables exceeded the recommended thresholds: $CR \geq 0.7$ and $AVE \geq 0.5$ (Fornell & Larcker, 1981; Hair et al., 2023). These findings

Table 1. Mean, standard deviation, skewness-kurtosis, and correlation values of the research variables

Variables	M	SD	Sk	Ku	1	2	3	4
1. NMP	71.78	23.409	0.022	-0.609	—	—	—	—
2. SNSA	20.46	6.072	0.135	-0.322	0.727***	—	—	—
3. DS	33.46	10.284	0.375	-0.301	0.379***	0.456***	—	—
4. PWB	40.70	7.324	-0.246	-0.430	-0.243***	-0.365***	-0.524***	—

N = 399.

Note: DS = Doomscrolling; Ku = Kurtosis; M = Mean; NMP = Nomophobia; PWB = Psychological well-being; SD = Standard deviation; Sk = Skewness; SNSA = Social network sites addiction.

*** $p < .001$.

establish adequate convergent validity for the scale's items. In addition to that, the discriminant validity of all items in this investigation was analyzed using the square root of the AVE value and the correlation coefficients between different factors. As illustrated in Table 2, all correlation coefficients between latent variables were below the square root of AVE, indicating strong discriminant validity (Fornell & Larcker, 1981). Ultimately, the constructs and scales demonstrated reliable and valid measures. Furthermore, this study employed Cronbach's alpha to assess item reliability. The Cronbach's α values for each variable ranged from 0.732 to 0.944, all well above the 0.80 threshold, thus meeting the satisfactory statistical cutoff value of 0.70 (Nunnally & Bernstein, 1994). Thus, the reliability and internal consistency of the instruments used in this analysis had satisfactory statistical reliability.

Mediation Model

A structural model was established which produced good fit indices $\chi^2 = 2.399$ ($df = 1$, $p = .121$), RMSEA = 0.059, NFI = 0.996, CFI = 0.997, SRMR = 0.0141, and TLI = 0.984 (Kline, 2016; Hair et al., 2023). Prior to performing the mediation analyses, the link between NMP and PWB was examined. The outcome indicated that the direct influence of NMP on PWB, with mediators present, was not statistically significant ($\beta = 0.095$, $p = .192$), thereby not supporting H1. NMP positively influenced SNSA ($\beta = 0.727$, $p = .001$), which confirms H2. In contrast, the direct effect of NMP on doomscrolling was not significant ($\beta = 0.101$, $p = .117$), thus not supporting H3. However, SNSA negatively predicted PWB ($\beta = -0.226$, $p = .004$), confirming H4. Likewise, doomscrolling negatively influenced PWB ($\beta = -0.457$, $p = .001$), providing support for H5. Additionally, a significant positive link between SNSA and doomscrolling ($\beta = 0.382$, $p = .001$) was observed, verifying H6. To examine the mediating effects of SNSA and doomscrolling, a bootstrapping analysis using a sample of 5000 was conducted. The results showed that SNSA fully mediated the relationship between NMP and PWB ($\beta = -0.036$, $p = .002$), supporting H7. On the other hand, the mediating role of doomscrolling in the relationship between NMP and PWB was not significant ($\beta = -0.014$, $p = .108$), indicating that H8 was not supported. Notably, NMP's impact on PWB was completely chain-mediated by SNSA and doomscrolling ($\beta =$

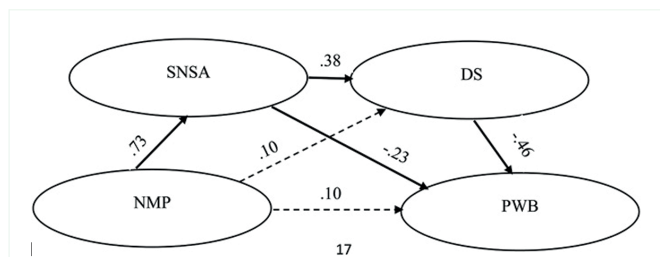


Figure 2. The structural model with standardized estimates. Note. DS = doomscrolling; NMP = nomophobia; PWB = psychological well-being; SNSA = social network sites addiction.

Table 2. Summary of measurement model evaluation for each construct																				
Construct	χ ²	CFI	RMSEA	TLI	SRMR	CR	AVE	α	Discriminant Validity											
									1	2	3	4	5	6	7					
NMP four factors (F)	2.303	0.954	0.057	0.946	0.045															
1. FI						0.878	0.643	0.876	0.802											
2. FII						0.852	0.535	0.852	0.729***	0.732										
3. FIHI						0.910	0.629	0.908	0.564***	0.665***	0.793									
4. FIV						0.855	0.543	0.854	0.583***	0.665***	0.644***	0.737								
5. SNSA	2.209	0.989	0.055	0.982	0.023	0.869	0.527	0.869	0.633***	0.706***	0.715***	0.663***	0.726							
6. DS	2.118	0.971	0.053	0.967	0.032	0.944	0.531	0.944	0.320***	0.342***	0.342***	0.365***	0.510***	0.729						
7. PWB	2.430	0.983	0.060	0.976	0.027	0.909	0.555	0.909	-0.228***	-0.260***	-0.221***	-0.182***	-0.409***	-0.558***	0.745					
Item loadings																				
Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
NMP FI	0.84	0.83	0.77	0.77																
NMP FII					0.76	0.74	0.74	0.69	0.73											
NMP FIHI										0.75	0.85	0.80	0.85	0.80	0.72					
NMP FIV																0.79	0.74	0.79	0.70	0.69
SNSA	0.77	0.78	0.73	0.77	0.63	0.66														
DS	0.65	0.65	0.63	0.74	0.74	0.71	0.70	0.79	0.80	0.78	0.75	0.70	0.78	0.70	0.75					
PWB	0.73	0.68	0.78	0.75	0.72	0.75	0.77	0.77												

α = Cronbach's alpha; χ^2 = Chi-square; AVE = Average variance extracted; CFI = Comparative fit index; CR = Composite reliability; DS = Doomscrolling; Factor I = Not being able to access information; Factor II = Giving up convenience; Factor III = Not being able to communicate; Factor IV = Loss of connection; NMP = Nomophobia; PWB = Psychological well-being; RMSEA = Root mean square error of approximation; SNSA = Social network sites addiction; SRMR = Standardized root mean square residual; TLI = Tucker-Lewis index. *** $p < .001$.

-0.039, $p = .001$), thus supporting H9. All path coefficients were significant in this model, as demonstrated in Figure 2. Detailed effect sizes of direct and indirect paths are outlined in Table 3.

Discussion

This study explored the complex relationships between NMP, SNSA, doomscrolling, and PWB in emerging adults, grounded in the transactional model of stress and coping. As hypothesized, significant correlations were found: NMP negatively correlated with PWB, but positively correlated with SNSA and doomscrolling. Additionally, SNSA and doomscrolling were positively correlated, reinforcing their interconnectedness.

The SEM analysis revealed that the direct path from NMP to PWB was not statistically significant when SNSA and doomscrolling were included in the model, suggesting that NMP influences PWB indirectly through these maladaptive coping behaviors. This reinforces the need to explore SNSA and doomscrolling as key mediators in the relationship between NMP and PWB. Specifically, the relationship between NMP and PWB received validation in previous research (Lee et al., 2018; Tuco et al., 2023). This study presents distinct research outcomes because it shows that NMP affects well-being through dysfunctional behavioral patterns. The NMP exists with compulsive social media behavior and exposure to negative content, which together produce detrimental impacts on well-being. The structural model also demonstrated that NMP significantly predicted SNSA, aligning with the idea that those with high levels of NMP are more likely to engage in compulsive social media use (Oraison & Wilson, 2024). This confirms that SNSA serves as a maladaptive coping mechanism for managing disconnection-related anxiety (Seo & Ray, 2019). However, NMP did not predict doomscrolling directly, suggesting that other psychological or contextual factors influence doomscrolling. This distinction warrants further investigation into the contextual triggers of doomscrolling, which may not be solely driven by NMP but could include factors like personality traits or media exposure.

Interestingly, both SNSA and doomscrolling contributed significantly to lower PWB, emphasizing the harmful effects of excessive online engagement and consuming distressing content. These behaviors can disrupt real-life interactions and elevate psychological distress (Blease, 2015; Choi & Lim, 2016; Satıcı et al., 2023). Moreover, SNSA significantly predicted doomscrolling, suggesting a pathway where increased social media use encourages doomscrolling. The transformation of doomscrolling from a purposeful behavior to a habitual, stress-reinforcing activity may help explain its negative effects on well-being (Sharma et al., 2022; Satıcı et al., 2023).

The mediational analysis indicated that SNSA completely mediated the relationship between NMP and PWB. This finding suggests that individuals with severe NMP may excessively rely on mobile phones to stay connected, which can lead to SNSA and poorer PWB. This result aligns with Choi and Lim (2016), Bevan et al. (2012), and Blease (2015), who found that SNSA mediates the relationship between social media overload and well-being. However, doomscrolling did not independently mediate the NMP-PWB relationship when SNSA was accounted for, reinforcing the idea that SNSA encompasses behaviors that may include doomscrolling, thus overshadowing its unique contribution (Gonzalez & MacKinnon, 2021).

The study also revealed a full-chain mediating effect of SNSA and doomscrolling in the link between NMP and PWB, eliminating the direct association between NMP and PWB. This chain mediation underscores the importance of SNSA and doomscrolling as intermediaries in this relationship. These external distractions serve as temporary coping mechanisms, which may fail to address the underlying sources of stress. This is consistent with Sriwilai and Charoensukmongkol's (2015) argument that such distractions can provide short-term relief but are ultimately maladaptive. While SNSA and doomscrolling may offer temporary relief from anxiety, they perpetuate a cycle of dependency on digital devices for emotional regulation, undermining PWB in the long run (Satıcı et al., 2023; Güme, 2024). This highlights the need for adaptive coping strategies that promote emotional resilience without relying on harmful digital behaviors.

Table 3. The standardized estimates of the SEM and hypothesis testing

Paths	β	SE	LCL	UCL	p	Result	Hypotheses
Standardized direct effects							
NMP → PWB	0.095	0.068	-0.049	0.219	0.192	Not significant	H1 not supported
NMP → SNSA	0.727	0.028	0.669	0.778	0.001	Significant	H2 supported
NMP → Doomscrolling	0.101	0.067	-0.027	0.238	0.117	Not significant	H3 not supported
SNSA → PWB	-0.226	0.072	-0.362	-0.078	0.004	Significant	H4 supported
Doomscrolling → PWB	-0.457	0.050	-0.553	-0.358	0.001	Significant	H5 supported
SNSA → Doomscrolling	0.382	0.068	0.242	0.511	0.001	Significant	H6 supported
Standardized indirect effects							
NMP → SNSA → PWB	-0.036	0.012	-0.060	-0.015	0.002	Full mediation	H7 supported
NMP → Doomscrolling → PWB	-0.014	0.010	-0.035	0.004	0.108	Not significant	H8 not supported
NMP → SNSA → Doomscrolling → PWB	-0.039	0.008	-0.059	-0.025	0.001	Chain mediation	H9 supported

Note: DS = Doomscrolling; LCL = Lower confidence limit; NMP = Nomophobia; PWB = Psychological well-being; SE = Standard error; SNSA = Social network sites addiction; UCL = Upper confidence limit.

The findings should be considered within India's socio-cultural context, where collectivism, high academic expectations, and close family involvement significantly shape student behavior (Chadda & Deb, 2013). The increase in mobile usage among Indian students after COVID likely intensified their feelings of NMP because SNSA is a key factor that bridges NMP to psychological distress in this study. The SNSA drives people into doomscrolling, which worsens their emotional state while compromising their well-being. This growing digital dependence creates a conflict with India's cultural values that prioritize mindful living and social connectedness (Kanchibhotla et al., 2024), and in doing so, potentially undermines core socio-cultural pillars such as collectivism, high academic expectations, and close family involvement. Evidence suggests that both mindfulness and social connectedness are declining among students (Alvarado-García et al., 2025; Chhajer & Hira, 2024; Varghese & Mathew, 2023) by impairing attention and emotional regulation (Singh et al., 2022) while fostering loneliness and social isolation (Engti et al., 2022; Singh et al., 2022), ultimately affecting students' well-being (Ganguly et al., 2022). Therefore, addressing SNSA is essential, as it serves as the main pathway through which NMP and doomscrolling disrupt psychological health.

The boundary conditions of this study offer further interpretive depth. During emerging adulthood, when individuals actively explore their identities and engage in intensified social comparison (Gyberg & Frisén, 2017), NMP may be more likely to trigger behavioral consequences (Baig & Rajini, 2024; Shabahang et al., 2023). The relationships between NMP and related outcomes may be influenced by emotion regulation, resilience, and access to social support. Individuals with strong offline social networks tend to exhibit better psychological regulation and may prefer adaptive coping strategies over SNSA or doomscrolling. Further empirical investigation is needed to examine these potential moderating factors, which were not included in the current study. Strengthening psychological resources in emerging adults may help transform digital engagement from a reactive escape into a conscious, regulated choice, thereby buffering the negative effects of NMP on well-being.

Importantly, these findings reinforce the transactional model of stress and coping framework's proposition that maladaptive coping arises when individuals perceive a stressor as overwhelming and lack appropriate coping resources (Lazarus & Folkman, 1984). Here, NMP is likely appraised as a threat to social inclusion, prompting avoidant strategies such as compulsive digital engagement. While such behaviors may offer short-term relief, they eventually lead to increased rumination, anxiety, sleep disturbances, and diminished well-being (Jennett et al., 2008; Sharma et al., 2022). This maladaptive feedback loop mirrors patterns found in substance addiction, providing comfort while worsening underlying distress (Yildirim & Correia, 2015).

Limitations

Acknowledging the study's limitations, including the inability to infer causality due to its cross-sectional nature and potential biases in participant self-reports, is essential. While this study focused on NMP, SNSA, doomscrolling, and PWB, there may be additional variables that may contribute to or moderate these relationships. Future research may explore other relevant factors, such as personality traits, emotion regulation, resilience, and social support, to enhance the understanding of technology-related mental health outcomes. Further studies, preferably using longitudinal or experimental designs, are needed to confirm the causal pathways. Despite these limitations, addressing NMP, SNSA, and doomscrolling through targeted interventions and educational initiatives holds promise for promoting healthier technology usage and enhancing overall well-being among emerging adults.

Implications

This study confirms that NMP negatively impacts PWB, with SNSA fully mediating this effect. When SNSA is considered, the role of doomscrolling as a mediator is less significant. The study underscores the chain mediation of SNSA and doomscrolling in the NMP-PWB relationship and emphasizes the need for adaptive coping strategies. It bridges educational psychology, clinical psychology, behavioral sciences, and digital well-being by advocating for Cognitive Behavioral Therapy, Acceptance and Commitment Therapy, and Mindfulness-Based Interventions. The transactional model of stress and coping framework also highlights the role of educational institutions in implementing targeted interventions and awareness campaigns, ultimately contributing to healthier digital habits and improved psychological resilience in emerging adults.

This research emphasizes the intricate interplay between NMP, SNSA, doomscrolling, and PWB, highlighting the critical role of SNSA in shaping well-being among emerging adults. The study reveals that SNSA not only mediates the relationship between NMP and PWB but also acts as a chain mediator that exacerbates the effects of NMP through doomscrolling behavior. These findings emphasize the urgent need for tailored mental health interventions that target SNSA and digital coping strategies, such as Acceptance and Commitment Therapy, Cognitive Behavioral Therapy, and Mindfulness-Based Interventions, to reduce the negative psychological impact of smartphone dependency. Addressing these behaviors in an increasingly digital world is crucial for improving well-being and promoting healthier interactions with technology.

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Author contributions

Conception: S.A.; Design: S.A., J.P.; Data acquisition: S.A.; Data analysis: S.A.; Data interpretation: S.A., J.P.; Drafting of the manuscript: S.A., J.P.; Critical revision of the manuscript: S.A., J.P. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Institutional Ethics Committee of Periyar University (Date: November 8, 2024, Decision/Protocol No: PU/001/IECRHS/2024-11). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that during the preparation of this study, the following AI-assisted technology was used: During the preparation of this work, we used AI language tools from November 25 to 30, 2024, for English language polishing of translated content. After using these tools, we reviewed and edited the content as needed and took full responsibility for the content of the publication.

References

- Al-Mamun, A. F., Başpınar, M. M., & Basat, O. (2022). The relationship of job satisfaction with nomophobia and social media addiction in healthcare professionals: A cross-sectional study. *Bağcılar Medical Bulletin*, 7(4), 311-318. [\[Crossref\]](#)
- Al-Mamun, F., Mamun, M. A., Prodhan, M. S., Mukhtarul, M., Griffiths, M. D., Muhit, M., & Sikder, M. T. (2023). Nomophobia among university students: Prevalence, correlates, and the mediating role of smartphone use between facebook addiction and nomophobia. *Heliyon*, 9(3), e14284. [\[Crossref\]](#)
- Alvarado-García, P. A. A., Soto-Vásquez, M. R., Infantes Gomez, F. M., Guzman Rodriguez, N. M., & Castro-Paniagua, W. G. (2025). Effect of a mindfulness program on stress, anxiety, depression, sleep quality, social support, and life satisfaction: A quasi-experimental study in college students. *Frontiers in Psychology*, 16, 1508934. [\[Crossref\]](#)
- Amez, S., & Baert, S. (2020). Smartphone use and academic performance: A literature review. *International Journal of Educational Research*, 103, 101618. [\[Crossref\]](#)
- Baig, M. G., & Rajini, T. (2024). The influence of smartphone addiction and nomophobia on lifestyle and mental health: Behavioural disruptions and intervention strategies. *International Journal of Indian Psychology*, 12(4), 677-679. [\[Crossref\]](#)
- Bartwal, J., & Nath, B. (2020). Evaluation of nomophobia among medical students using smartphones in North India. *Medical Journal, Armed Forces India*, 76(4), 451-455. [\[Crossref\]](#)
- Bevan, J. L., Pfyl, J., & Barclay, B. (2012). Negative emotional and cognitive responses to being unfriended on Facebook: An exploratory study. *Computers in Human Behavior*, 28(4), 1458-1464. [\[Crossref\]](#)
- Blease, C. R. (2015). Too many 'friends,' too few 'likes'? Evolutionary psychology and 'Facebook depression'. *Review of General Psychology*, 19(1), 1-13. [\[Crossref\]](#)
- Bülbüloğlu, S., Özdemir, A., Kapıkıran, G., & Sarıtaş, S. (2020). The effect of nomophobia behavior of nurses working at surgical clinics on time management and psychological well-being. *Journal of Substance Use*, 25(3), 318-323. [\[Crossref\]](#)
- Can, L., & Kaya, N. (2016). Social networking sites addiction and the effect of attitude towards social network advertising. *Procedia-Social and Behavioral Sciences*, 235, 484-492. [\[Crossref\]](#)
- Canero Perez, M., Mónaco Gerónimo, E., & Montoya Castilla, I. (2019). Emotional intelligence and empathy as predictors of subjective well-being in university students. *European Journal of Investigation in Health, Psychology and Education*, 9(1), 19-29. [\[Crossref\]](#)
- Chadda, R. K., & Deb, K. S. (2013). Indian family systems, a collectivistic society, and psychotherapy. *Indian Journal of Psychiatry*, 55(Suppl. 2), S299-S309. [\[Crossref\]](#)
- Chhajer, R., & Hira, N. (2024). Exploring positive psychology intervention and mindfulness-based intervention in nature: Impact on well-being of school students in India. *Frontiers in Public Health*, 12, 1297610. [\[Crossref\]](#)
- Choi, S. B., & Lim, M. S. (2016). Effects of social and technology overload on psychological well-being in young South Korean adults: The mediatory role of social network service addiction. *Computers in Human Behavior*, 61, 245-254. [\[Crossref\]](#)
- Collier, J. (2020). *Applied structural equation modeling using AMOS: Basic to advanced techniques*. (1st ed.). Routledge. [\[Crossref\]](#)
- Davey, S., & Davey, A. (2014). Assessment of smartphone addiction in Indian adolescents: A mixed-method study by systematic review and meta-analysis approach. *International Journal of Preventive Medicine*, 5(12), 1500-1511.
- Diener, E., Wirtz, D., Tov, W., Kim-Prieto, C., Choi, D. W., Oishi, S., & Biswas-Diener, R. (2010). New well-being measures: Short scales to assess flourishing and positive and negative feelings. *Social Indicators Research*, 97(2), 143-156. [\[Crossref\]](#)
- Dolapoğlu, N., Türk, E., Yürür, E. K., Can, M. Ş., Alçı, D., Tulacı, R. G., Baykan, H., & Karlıdere, T. (2025). Never without my mobile phone: The relationship between nomophobia, social media addiction and emotion regulation difficulties. *Bağımlılık Dergisi*, 26(1), 59-67. [\[Crossref\]](#)
- Engti, R., Momin, M. H., & Vyas, S. N. (2022). Social media addiction and its impact among the school students during Covid-19 lockdown in an urban area of Western India: A cross-sectional study. *International Journal of Research in Medical Sciences*, 10(12), 2870. [\[Crossref\]](#)

- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18(1), 39-50. [\[Crossref\]](#)
- Ganguly, A., Mukherjee, T., & Chowdhury, S. (2022). Social media addiction, fear of missing out and social competence of adolescents: An exploratory study. *Indian Journal of Clinical Psychology*, 49(3).
- Gonzalez, O., & MacKinnon, D. P. (2021). The measurement of the mediator and its influence on statistical mediation conclusions. *Psychological Methods*, 26(1), 1-17. [\[Crossref\]](#)
- Güme, S. (2024). Doomscrolling: A review. *Psikiyatride Güncel Yaklaşımlar*, 16(4), 595-603. [\[Crossref\]](#)
- Gyberg, F., & Frisén, A. (2017). Identity status, gender, and social comparison among young adults. *Identity*, 17(4), 239-252. [\[Crossref\]](#)
- Hair, J., Hair Jr., J. F., Sarstedt, M., Ringle, C. M., & Gudergan, S. P. (2023). *Advanced issues in partial least squares structural equation modeling*. Sage Publications.
- Humood, A., Altooq, N., Altamimi, A., Almoosawi, H., Alzafiri, M., Bragazzi, N. L., Husni, M., & Jahrami, H. (2021). The prevalence of nomophobia by population and by research tool: A systematic review, meta-analysis, and meta-regression. *Psych*, 3(2), 249-258. [\[Crossref\]](#)
- Hussain, Z., & Griffiths, M. D. (2018). Problematic social networking site use and comorbid psychiatric disorders: A systematic review of recent large-scale studies. *Frontiers in Psychiatry*, 9, 686. [\[Crossref\]](#)
- Hylkilä, K., Männikkö, N., Peltonen, A., Castrén, S., Mustonen, T., Konttila, J., Männistö, M., & Kääriäinen, M. (2024). Association between problematic social networking site use and social well-being among young adults: A systematic review. *Journal of Affective Disorders Reports*, 16, 100775. [\[Crossref\]](#)
- Jahrami, H., Fekih Romdhane, F., Pandi-Perumal, S. R., BaHammam, A. S., & Vitiello, M. V. (2023). Global research evidence on nomophobia during 2008-2022: A bibliometric analysis and review. *Psychology, Health and Medicine*, 1-16.
- Jennett, C., Cox, A. L., Cairns, P., Dhopee, S., Epps, A., Tijs, T., & Walton, A. (2008). Measuring and defining the experience of immersion in games. *International Journal of Human-Computer Studies*, 66(9), 641-661. [\[Crossref\]](#)
- Kanchibhotla, D., Harsora, P., & Subramanian, S. (2024). Influence of yogic breathing in increasing social connectedness among Indian adults. *Acta Psychologica*, 243, 104164. [\[Crossref\]](#)
- Kardefelt-Winther, D. (2014). A conceptual and methodological critique of internet addiction research: Towards a model of compensatory internet use. *Computers in Human Behavior*, 31, 351-354. [\[Crossref\]](#)
- Katz, E., Blumler, J. G., & Gurevitch, M. (1973). Uses and gratifications research. *Public Opinion Quarterly*, 37(4), 509-523. [\[Crossref\]](#)
- Kim, E., Song, D., Park, D., Kim, H., & Shin, G. (2024). Effect of smartphone use on cervical spine stability. *Journal of Biomechanics*, 166, 112053. [\[Crossref\]](#)
- King, A. L. S., Valença, A. M., & Nardi, A. E. (2010). Nomophobia: The mobile phone in panic disorder with agoraphobia: Reducing phobias or worsening of dependence?. *Cognitive and Behavioral Neurology: Official Journal of the Society for Behavioral and Cognitive Neurology*, 23(1), 52-54. [\[Crossref\]](#)
- Kline, R. B. (2016). *Principles and practice of structural equation modeling* (3rd ed.). Guilford Press.
- Koc, M., & Gulyagci, S. (2013). Facebook addiction among Turkish college students: The role of psychological health, demographic, and usage characteristics. *Cyberpsychology, Behavior and Social Networking*, 16(4), 279-284. [\[Crossref\]](#)
- Kuss, D. J., & Griffiths, M. D. (2011). Online social networking and addiction-a review of the psychological literature. *International Journal of Environmental Research and Public Health*, 8(9), 3528-3552. [\[Crossref\]](#)
- Lazarus, R. S., & Folkman, S. (1984). *Stress, appraisal, and coping*. Springer.
- Lee, S., Kim, M., Mendoza, J. S., & McDonough, I. M. (2018). Addicted to cell phones: Exploring the psychometric properties between the nomophobia questionnaire and obsessiveness in college students. *Heliyon*, 4(11), 2018.e00895. [\[Crossref\]](#)
- Lin, C. Y., Potenza, M. N., Ulander, M., Broström, A., Ohayon, M. M., Chattu, V. K., & Pakpour, A. H. (2021). Longitudinal relationships between nomophobia, addictive use of social media, and insomnia in adolescents. *Healthcare*, 9(9), 1201. [\[Crossref\]](#)
- Maftai, A., & Pătrăușanu, A. M. (2024). Digital reflections: Narcissism, stress, social media addiction, and nomophobia. *Journal of Psychology*, 158(2), 147-160. [\[Crossref\]](#)
- Nawaz, S. (2023). Rethinking classifications and metrics for problematic smartphone use and dependence: Addressing the call for reassessment. *Computers in Human Behavior Reports*, 12, 100327. [\[Crossref\]](#)
- Nunnally, J., & Bernstein, I. (1994). *Psychometric theory* (3rd ed.). MacGraw-Hill.
- Oraison, H., & Wilson, B. (2024). The relationship between nomophobia, addiction, and distraction. *Journal of Technology in Behavioral Science*, 9(4), 745-751. [\[Crossref\]](#)
- Podsakoff, P. M., MacKenzie, S. B., Lee, J.-Y., & Podsakoff, N. P. (2003). Common method biases in behavioral research: A critical review of the literature and recommended remedies. *Journal of Applied Psychology*, 88(5), 879-903. [\[Crossref\]](#)
- Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology*, 57(6), 1069-1081. [\[Crossref\]](#)
- Satici, S. A., Gocet Tekin, E., Deniz, M. E., & Satici, B. (2023). Doomscrolling scale: Its association with personality traits, psychological distress, social media use, and well-being. *Applied Research in Quality of Life*, 18(2), 833-847. [\[Crossref\]](#)
- Seo, D., & Ray, S. (2019). Habit and addiction in the use of social networking sites: Their nature, antecedents, and consequences. *Computers in Human Behavior*, 99, 109-125. [\[Crossref\]](#)
- Shabahang, R., Kim, S., Hosseinkhanzadeh, A. A., Aruguete, M. S., & Kakabarade, K. (2023). Give your thumb a break. *Media Psychology*, 26(4), 460-479. [\[Crossref\]](#)
- Sharma, B., Lee, S. S., & Johnson, B. K. (2022). Supplemental material for the dark at the end of the tunnel: Doomscrolling on social media newsfeeds. *Technology, Mind, and Behavior*, 3(1), 144-156. [\[Crossref\]](#)
- Singh, S., Singh, S., & Sharma, M. (2022). A study on mental health of students addicted to social networking sites. *International Journal of Indian Psychology*, 10(1), 565-571. [\[Crossref\]](#)
- Sriwilai, K., & Charoensukmongkol, P. (2015). Face it, do not Facebook it: Impacts of social media addiction on mindfulness, coping strategies, and the consequences on emotional exhaustion. *Stress and Health*, 32(4), 427-434. [\[Crossref\]](#)

- Statista (2023). *The number of smartphone users in India from 2010 to 2023, with estimates for 2040 (in millions)*. Statista. <https://www.statista.com/statistics/467163/forecast-of-smartphone-users-in-india/>
- Taskin, S., Yildirim Kurtulus, H., Satıcı, S. A., & Deniz, M. E. (2024). Doomscrolling and mental well-being in social media users: A serial mediation through mindfulness and secondary traumatic stress. *Journal of Community Psychology*, 52(3), 512-524. [Crossref]
- Tuco, K. G., Castro-Diaz, S. D., Soriano-Moreno, D. R., & Benites-Zapata, V. A. (2023). Prevalence of nomophobia in university students: A systematic review and meta-analysis. *Healthcare Informatics Research*, 29(1), 40-53. [Crossref]
- Turel, O., & Serenko, A. (2012). The benefits and dangers of enjoyment with social networking websites. *European Journal of Information Systems*, 21(5), 512-528. [Crossref]
- Türk-Kurtça, T. (2025). Generalized anxiety disorder and social media addiction relationships: The role of psychological resilience, doomscrolling, and cyberchondria severity. *Psihologija*, 58(3), 319-342. [Crossref]
- Utz, S., & Breuer, J. (2017). The relationship between the use of social network sites, online social support, and well-being. *Journal of Media Psychology*, 29(3), 115-125. [Crossref]
- Varghese, M. S. M., & Mathew, M. A. M. (2023). Social connectedness, academic self-efficacy, and life satisfaction among international and domestic college students from India. *International Journal of Indian Psychology*, 11(3), 682-690. [Crossref]
- Wibowo, A., & Safaria, T. (2025). The role of FOMO on psychological well-being with nomophobia as a mediator among college students. *Current Psychology*, 44(7), 6092-6101. [Crossref]
- Xu, H., & Tan, B. C. (2012). *Why do I keep checking Facebook: Effects of message characteristics on the formation of social network services addiction*. ICIS 2012 Proceedings.
- Yildirim, C., & Correia, A. P. (2015). Exploring the dimensions of nomophobia: Development and validation of a self-reported questionnaire. *Computers in Human Behavior*, 49, 130-137. [Crossref]

Brief psychoeducational intervention to decrease parental distress and increase self-efficacy of parents of video game players: A pilot study

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Abstract

Gaming is prevalent, especially for children and adolescents. It is a modern form of entertainment if within considerable limits. However, the definition of excessive gaming is unclear and parents have difficulties managing gaming behavior. The current study aims to test a pilot brief psychoeducational intervention for parents to help them gain a broader comprehension of gaming behavior and to support managing caregiver burden. Intervention participants attended a 90-minute brief psychoeducation intervention and wait-list control participants received no treatment. The Depression Anxiety Stress Scale Short Form, Parental Self-Efficacy Scale, and the Demographic Form were used. There was a significant decrease in depression, anxiety, and stress scores from pre- to post-measurement only in the intervention group. There were no significant differences in parental self-efficacy scores. The results revealed the effectiveness of a brief psychoeducational intervention to support parents of gamers. Future studies are necessary to tailor specific interventions depending on differential needs and delivery methods.

Keywords: caregiver burden, internet addiction disorder, parenting, parent-child relations, psychological, stress, video games

Main points

- Parents of gamers had decreases in depression, anxiety, and stress scores after a brief 90-minute psychoeducational intervention compared to a wait-list control group.
- Parental self-efficacy scores did not change significantly.
- Parents and caregivers need more support to understand the gaming behavior of their children.
- Future studies are advised to modulate treatment and sample characteristics to acknowledge what works for whom, when, and under what circumstances.

Introduction

Technological advances have opened a new venue for our lives and games are part of this process. There is such rapid development and expansion in games that gaming vocabulary has been ever-evolving globally. Technology-based games may be named online, offline, computer, or mobile games. The current study focuses on games in a video format. The complexity of naming expands to the definition of its normal vs. excessive use. The International Classification of Diseases-11 (ICD-11) includes gaming disorder as a classification

highlighting impaired control and inability to stop gaming despite negative consequences (World Health Organization, 2021). The Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR) includes internet gaming disorder as a condition for further study highlighting preoccupation, tolerance, withdrawal, inability to control, and negative consequences (American Psychiatric Association, 2022). Research highlights that the ICD-11 criteria may leave people undiagnosed (Borges et al., 2020) and the DSM-5-TR criteria are far from definite (Griffiths et al., 2016). Epidemiological studies utilizing a variety of definitions and

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measurements to overcome difficulties with a lack of proper definition suggest a pooled prevalence rate of 3.3%; however, rates for young age and boys are higher (Kim et al., 2022).

Several etiological factors have been highlighted to understand why regular gaming becomes problematic. Availability of media and preference for media-based (e.g., TV, computer, etc.) leisure activities as opposed to social contacts are important predictors (Bender et al., 2020; Macur & Pontes, 2021; Wartberg et al., 2017). Male gender and younger age are among the person-level risk factors (Kim et al., 2022; Rehbein & Baier, 2013; Wartberg et al., 2017). Psychological trait variables including high impulsivity, low self-control, low attentional span, and high depressiveness are also predictive (Bender et al., 2020; Gentile, 2009; Macur & Pontes, 2021; Wartberg et al., 2017). Psychosocial factors including school and family life constitute another risk domain (Gentile, 2009; Rehbein & Baier, 2013). Parent-child relationships are a specific area of interest in this realm. A systematic review points to an inverse relationship between the quality of the parent-child relationship and the severity of problem gaming (Schneider et al., 2017), and more recent studies corroborate this finding (Bender et al., 2020; Macur & Pontes, 2021). Moreover, parental factors are reported to be as explanatory as individual factors in understanding the gaming behavior of children and adolescents (Nielsen et al., 2020).

Even though the definition is fuzzy, and the reasons are complex, there is a convergence in using Cognitive Behavioral Therapy to treat gaming-related problems (King et al., 2017). However, other treatment options promise efficacy (King et al., 2017). Family-based treatments stand out considering the role of family and social dynamics in etiology especially for adolescents who experience the problem at its peak (Kim et al., 2022; King et al., 2017; Schneider et al., 2017). Multidimensional Family Therapy (MDFT), which focuses on family-, school-, and friends-related risk and protective factors to heal substance addictions, has been adapted to gaming in a randomized controlled trial (Nielsen et al., 2021). Increasing the therapeutic alliance with both parties, validating parents' emotions and efforts, and helping them create room for effective parent-child communication are targets for this treatment (Bonnaire et al., 2019). The MDFT outperforms family therapy as usual, with lower drop-out rates and decreased symptoms favoring MDFT (Nielsen et al., 2021).

The direct involvement of parents and their engagement in the psychotherapeutic process are important to support children and adolescents and increase the therapy's effectiveness. Few studies in the literature report promising results in the gaming behavior of children and adolescents by intervening in parent-child communication patterns and parenting practices (De Lepeleere et al., 2017; Hidaayah et al., 2022; Hülquist et al., 2022; Nielsen et al., 2021). However, the definition of problem gaming is unclear, and the goal is not abstinence from gaming (Bonnaire et al., 2019; Borges et al., 2020; Griffiths et al., 2016). So, parents should not be perceived solely as supporting sources for treatment protocols. Instead, they constitute a valuable resource to intervene in problematic and risky gaming

and promote healthy gaming behaviors. This perspective aligns with the multilevel healthcare management approach encompassing preventive, curative, rehabilitative, and health-promoting efforts altogether (Tengilimoğlu et al., 2017).

The Family Stress Model is informative to conceptualize parent-child relationships from a multilevel healthcare management perspective. It asserts that disrupted parenting strongly predicts child and adolescent adjustment problems (Masarik & Conger, 2017). Furthermore, the relationship between parenting and child and adolescent adjustment problems is reciprocal. The literature on the caregiving burden portrays how caregiving to disordered relatives may create psychosocial and physical health problems in caregivers with examples from a variety of disorders (Yıldırım et al., 2017). However, to the best of the author's knowledge, only one study focuses on the caregiver burden of caregivers of gamers. This study presents two cases in which caregivers (e.g., parents) suffer from disturbances in family routine and interaction, problems related to quality of life, and physical and mental health (Sharma, 2016). These case reports discuss the feelings of helplessness experienced by parents of gamers. Parents generally fall behind in understanding the underlying mechanisms of need satisfaction and social triggers of excessive gaming (Liu et al., 2015).

The current state-of-the-art in gaming reveals the need to support parents and their children. Despite the urgency of caregiver support programs in gaming research, there is a paucity of research in this area. There is only one known pilot study on strengthening parents of adolescents with problem gaming (Hülquist et al., 2022). The intervention consists of eight weekly modules (each lasting 90 minutes). The four topics covered in these modules are understanding problematic gaming, family interactions, rules and role models, and family health and prevention. The intervention is effective in improving family communication and decreasing parental psychosocial stress but ineffective in parental self-efficacy (Hülquist et al., 2022). More research is needed to understand which type of intervention is effective for this population. Caregivers of gamers correspond mostly to parents of child and adolescent gamers considering the age-contingent prevalence rates (Kim et al., 2022). Accordingly, the current study is designed to analyze the efficacy of a one-shot psychoeducational intervention in a seminar format to modulate levels of parental efficacy and psychological symptoms of the attendee parents of gamers. Aligning with a holistic approach to health, the study targets caregivers (e.g., parents) of primary- and secondary-level school students with no clinical status restriction (Tengilimoğlu et al., 2017) as opposed to the existing interventions on gaming (Hülquist et al., 2022). The results are expected to be informative in understanding how the effectiveness of intervention programs can be increased to support parental efficacy and decrease the psychological symptoms of caregivers of gamers.

Material and Methods

The study is part of a broader project focusing on understanding social and family dynamics that explain the gaming behavior of children and adolescents. It is approved by Istanbul University Institutional Review Board (date: November 27, 2023, number: 2023/387). The first phase of the project is over, and the related descriptive and cross-sectional findings are in preparation for publication. Three public schools from low-mid socioeconomic neighborhoods in Istanbul were approached via convenience sampling. All schools offered both primary- and secondary-level education. The study targeted parents of primary- and secondary-school students following the principle that the earlier preventive intervention starts, the more effective it becomes (Kuss & Griffiths, 2012). Cooperation with parents of public school students from low-mid socioeconomic status districts was prioritized to capture family-, school-, and social-related risk factors as suggested in the literature (Nielsen et al., 2021; Rehbein & Baier, 2013). All schools agreed to collaborate on the general project. The schools advertised the project to parents and provided physical space for the intervention and the data collection. The inclusion criteria were parenting a child attending the collaborating school, having at least one gaming child at the primary or secondary-level school, and informed consent. The exclusion criterion was inability to comprehend the Turkish language. All participants provided informed consent. No incentives (such as payment, gifts, etc.) were provided in return for study participation.

Participants

The current study included 31 parents (intervention group: 15 mothers and one father, wait-list control group: 14 mothers and one father) from a large-scale project about gaming and parenting. The demographic characteristics of the participants are presented in Table 1.

Data Collection Tools

Depression Anxiety Stress Scale Short Form

It is a three-factor, 21-item, 4-point Likert scale measuring depression, anxiety, and stress symptoms in the last week (Henry & Crawford, 2005). The scale was adapted to Turkish by Yilmaz et al. (2017). All items and the factor structure were the same in the adaptation study. Cronbach's alphas were 0.88, 0.82, and 0.90 for depression, anxiety, and stress, respectively. Cronbach's alpha in the current study was not calculated due to the small sample size per condition ($n < 30$, Birmingham City University, 2017).

Parental Self-Efficacy Scale

It is a one-factor, 12-item, 7-point Likert scale measuring parents' perceived parental self-efficacy (Caprara et al., 2004). The scale was adapted to Turkish by Demir and Gündüz (2014). The resulting factor structure was a one-factor 11-item scale. Cronbach's alpha was 0.91. Cronbach's alpha in the current study was not calculated due to the small sample size per condition ($n < 30$, Birmingham City University, 2017).

Demographics Form

It was developed by the researcher to collect information about the study participants (ex., age, socioeconomic and marital status, etc.), their gamer child (ex., age, gender, school grade, etc.), and the type of games he/she plays.

Procedure

Intervention

The intervention was held as a 90-minute psychoeducational seminar including a Q&A session. All presenters were undergraduate senior students. They volunteered to be presenters of the seminar. They had nine hours of theoretical and six hours of practical training on gaming as part of the clinical psychology-oriented elective course that they participated in. Three of them presented information on what addiction is, when and how gaming becomes problematic, the experiences of gamers, how families can help them overcome this problem, and the healing journey. Then another student presented a case example. The last student answered further questions from the attendees. The presented information followed the flow of a handbook on internet addiction (Feindel, 2019). The book reference along with the front cover was included in the PowerPoint presentation. Flyers summarizing the seminar were handed out to the attendees at the end of the meeting. The author supervised the whole process.

Data Collection Process

The current study is part of an institutional collaboration project of Istanbul University. The project focuses on understanding parents' experiences with their children's gaming. Gaming is not restricted to clinical diagnosis. Instead, the project welcomes all parents who report that their children play video games. The project has quantitative and qualitative steps. The current study constitutes a part of the project.

The current study utilizes a quasi-experimental design with intervention and wait-list control groups without randomization. The intervention group includes data from one school where parents attended the seminar and filled out pre- and post-measurements. The wait-list control group includes data from a convenience sample where parents were asked to

Table 1. Demographic characteristics of the participants

	Intervention Group		Wait-list Control Group	
	Mean	SD	Mean	SD
Age of participant	38.55	7.99	41.07	4.77
Number of children	2.09	0.70	2.00	0.76
Age of the children with problematic gaming	8.55	3.80	9.71	1.94
Duration of the child's gaming (hours)	2.36	1.69	1.58	1.49
	n	%	n	%
Parent's self-reported perception of the child's gaming is disordered				
Yes	6	37.5	3	20.0
No	10	62.5	12	80.0
Gender of the child with problematic gaming				
Girl	6	37.5	7	46.7
Boy	9	56.3	8	53.3
Previous treatment for problematic gaming				
Yes	5	31.3	0	0.0
No	10	62.5	12	80.0
Level of education (self)				
Primary school	3	18.8	1	6.7
Secondary school	7	43.8	1	13.3
High school	4	25.0	3	20.0
Vocational training	1	6.3	1	6.7
Undergraduate	1	6.3	8	53.5
Masters	0	0.0	1	6.7
PhD	0	0.0	1	6.7
Level of education (partner)				
Primary school	4	25.0	0	0.0
Secondary school	8	50.0	0	0.0
High school	3	18.8	3	20.0
Vocational training	0	0.0	0	0.0
Undergraduate	1	6.3	12	80.0
Masters	0	0.0	2	13.3
PhD	0	0.0	3	20.0
Working status (self)				
Not working	16	100.0	11	73.3
Working without insurance	0	0.0	0	0.0
Working with insurance	0	0.0	4	26.7
Working status (partner)				
Not working	1	6.3	0	0.0
Working without insurance	3	18.8	0	0.0
Working with insurance	12	75.00	15	100.0
Monthly income				
0–11,402.00	3	18.8	0	0.0
11,403.00–22,805.00	7	43.8	0	0.0
22,806.00–33,208.00	4	25.0	2	13.3
33,209.00–44,611.00	1	6.3	0	0.0
44,612.00–56,014.00	1	6.3	2	13.3
56,015.00–67,417.00	0	0.0	2	13.3
47,418+	0	0.0	9	60.0

fill out pre- and post-measurements without participating in the intervention. They were asked to have a 90-minute break between two measurements. In both groups, data collection was carried out via Google Forms or printed forms depending

on participant preference. The students of the elective course were available during data collection to offer technical and practical help if needed. The scales were presented randomly in both measurements. Demographic information was

asked at the end of the preintervention measurement only. Participants were asked to consider the current moment (not the last week) to fill out the Depression Anxiety Stress Scale Short Form (DASS 21) as part of the post-measurement.

Data Analysis

SPSS v30 Package (IBM SPSS Corp.; Armonk, NY, USA) was used for data analysis. Data from the voluntary participants were checked for the parametric test assumptions before the main analyses. Missing data were mean replaced. The results of the Shapiro-Wilk tests revealed that the normality assumption was met for depression and stress pre- and post-measurements in both groups. Anxiety scores were normally distributed for post-measurement scores in both groups. Anxiety scores were normally distributed for pre-measurement scores in the wait-list control group but not in the treatment group ($S-W(15) = 0.80, p < .05$). In the wait-list control group, parental self-efficacy scores were normally distributed for post-measurement but not for pre-measurement ($S-W(14) = 0.86, p < .05$). They were not normally distributed for pre- ($S-W(15) = 0.88, p < .05$) and post-measurement ($S-W(15) = 0.86, p < .05$) scores in the intervention group. The visual inspection of the histograms and Q-Q plots showed that assumption violations were mostly due to utilizing a conservative procedure and were negligible. So, Pillai's trace statistics were reported in multivariate comparisons (Olson, 1976).

Results

As for the demographic findings, the mean age of participants was 38.55 ($SD = 7.99$) in the intervention and 41.07 ($SD = 4.77$) in the wait-list control group. The participants had 2.09 ($SD = 0.70$) children on average in the intervention group and 2.00 ($SD = 0.76$) children on average in the wait-list control group. They reported that their children played approximately 2.36 ($SD = 1.69$) hours per day in the intervention group and 1.58 ($SD = 1.49$) hours per day in the wait-list control group. Participants' age ($t(29) = 1.39, p > .05, \eta^2 = 0.07$), number of children ($t(29) = 0.48, p > .05, \eta^2 = 0.01$), and child's hours of

gaming per day ($t(29) = 1.66, p > .05, \eta^2 = 0.10$) were similar across groups.

All parents were married. Wait-list control group presented with a comparably higher socioeconomic status. In the intervention group, 37.5% ($n = 6$) of parents thought their child had a problematic gaming pattern whereas it was 20.0% ($n = 3$) in the wait-list control group. The participants were generally able to name the games that their children played. The review of game preferences of the children as reported by the parents revealed similar preferences across groups. However, statistical analyses were not possible for these variables due to a high number of cells with low expected frequencies (see Table 1 and Table 2). So, there were no covariates in the multivariate model.

A mixed design repeated measures MANOVA was utilized with group (intervention vs wait-list control), measurement time (pre vs post), and scale (PSES total score, DASS subscale scores) as independent variables. Multivariate tests revealed that only the three-way interaction was statistically significant such that depression, anxiety, and stress scores decreased from pre- to post-measurement only in the intervention group (Pillai's trace = 0.28, $F(3, 27) = 3.51, p < .05, \eta_p^2 = 0.28$). All other interaction effects were insignificant. The results are summarized in Table 3.

Discussion

The current study results reveal that a 90-minute psychoeducational intervention helps to decrease levels of depression, anxiety, and stress of parents of gamers compared to a wait-list control. However, it is not effective in significantly increasing levels of parental self-efficacy.

Perceived stress levels of parents of problematic gamers were responsive to intervention in another pilot study (Hülquist et al., 2022). Available case studies underline clinical psychiatric distress levels in parents of excessive gamers (Sharma, 2016). Other studies point to the effectiveness of one-shot interventions in reducing parental stress (VanVoorhis et al., 2023). So, being able to decrease the stress levels of parents of gamers constitutes the possibility of a quick solution

Table 2. The game preferences of their children as reported by the participants

	Intervention Group		Wait-list Control Group	
	n	%	n	%
I don't know	1	6.3	1	6.7
Action/strategy games: League of Legends (LOL), Civilization, Warcraft, Age of Empires, etc.	6	37.5	2	13.3
Shooting games: Valorant, PUBG, Counter Strike, Call of Duty, Battlefield, etc.	4	25.0	2	13.3
Survival/construction and management games: Minecraft, The Forest, ARK: Survival Evolved, Valheim, etc.	4	25.0	5	33.3
Adventure/role playing games: GTA, Genshin Impact, The Witcher, Assassin's Creed, Detroit: Become Human, etc.	3	18.8	2	13.3
Simulation games: The Sims, Euro Truck Simulator (ETS), etc.	1	6.3	5	33.3
Platform games: Mario, Ori, Dead Cells, Limbo, etc.	5	31.3	6	40.0

Reliable between-group comparisons were not possible for noncontinuous variables due to cells with low expected frequencies.

Table 3. The results of the multivariate model

Group	Variable	Pre-test Mean (SD)	Post-test Mean (SD)	p	95% Confidence Interval for Difference	
					Lower Bound	Upper Bound
Intervention	Depression	4.19 (2.90)	3.25 (2.62)	.04	0.03	1.84
	Anxiety	4.94 (2.69)	3.47 (1.95)	.01	0.46	2.48
	Stress	6.13 (2.16)	4.81 (1.94)	.02	0.23	2.40
	Parental self-efficacy	63.75 (13.46)	64.06 (13.87)	.74	-2.25	1.62
Wait-list control	Depression	4.00 (2.59)	3.40 (2.23)	.20	-0.33	1.53
	Anxiety	3.33 (2.74)	3.00 (2.42)	.52	-0.71	1.38
	Stress	5.07 (2.76)	5.80 (2.88)	.19	-0.39	1.85
	Parental self-efficacy	61.07 (15.75)	60.60 (14.83)	.64	-1.53	2.47

Pillai's trace = 0.28, $F(3, 27) = 3.51$, $p < .05$, $\eta_p^2 = 0.28$

to a prevalent problem. Furthermore, offering a shorter intervention compared to the existing one-shot interventions in the literature (Hülquist et al., 2022), the current intervention portrays practical utility.

Psychiatric distress in the case studies in the literature encompasses depression, anxiety, and stress (Sharma, 2016). Levels of depression, anxiety, and stress correlate with each other in general (Henry & Crawford, 2005; Yılmaz et al., 2017). Similarly, the current intervention is effective in producing simultaneous decreases in psychiatric symptoms. Considering feelings of loneliness and hopelessness as depressive symptoms, the current intervention might have been effective by changing participants' beliefs about these feelings through a psychoeducational format. The participants might have taken a broader perspective to see that gaming is a prevalent problem and neither they nor their children are the sole victims. Also, they might have personally experienced that there is professional help offered by the readily existing schooling services in cooperation with other institutions. Both the intervention design and content are thought to target these beliefs successfully.

Parental self-efficacy did not show a significant change in the intervention and wait-list control conditions, although the insignificant change was in the expected direction only in the intervention group. Parenting is affected by the psychological distress levels of parents and their children (Masarik & Conger, 2017). However, parental self-efficacy scores stayed similar across measurements as opposed to changing depression, anxiety, and stress levels in the current study. Even longer interventions in the gaming literature show a significant increase in parental self-efficacy levels of parents only at the descriptive level (Hülquist et al., 2022). Similar treatment-contingent changes are observed in parent-adolescent communication (Hülquist et al., 2022; Liu et al., 2015). So, a 90-minute psychoeducational intervention may not be sufficient to provide the expected effects observed in the literature. Alternatively, the measurement of general parental self-efficacy but not parental self-efficacy peculiar to the child's gaming behavior may explain this result. A more specific measure might have detected changes in the self-efficacy perception of parents about child gaming. Supporting this view, study results point to significant differences in perceived efficacy for study-specific parenting practices

of parents of disabled children (Lane et al., 2021). However, there is no known scale that specifically assesses gaming-related efficacy of parents. There are some recent attempts to operationalize this variable through a set of questions (Gruchel et al., 2022; Krossbakken et al., 2018). Developing a scale that focuses on gaming-related parental efficacy may be a necessary next step for the field (Birol & Birol, 2022).

The study provides a one-shot example to the literature on fighting the parental burden of gamers. The results are informative and promising. However, they should be considered with the study limitations. First, the study included a low number of participants from a single school in Istanbul in the intervention condition and a low number of participants via convenience sampling in the wait-list control condition. Also, most of the attending parents were mothers. So, the results may not be generalizable to fathers, diverse populations, or the general public. However, the study prioritized a low-mid socioeconomic district to offer intervention support to more vulnerable populations first.

Second, there was only one intervention group and one passive control group (i.e., wait-list control group). The coexistence of an active control group might have revealed levels, producing more sound results. No randomization was possible, raising the issue of any selection bias. Indeed, voluntary participants in the intervention group may be the ones who are by themselves more responsive to any intervention. This possibility diminishes the validity of the study findings. Lacking an active control group and randomization were related to constraints of time and labor force in the collaborating institutions. Future collaborations may seek funds to overcome those practical problems. It may help to capture real-world experiences with no methodological costs with sound power analysis at the start of the research conduction.

Third, treatment adherence was not measured by blind reviewers. The author tracked adherence to the reference material. However, she was not blind to the study aim, and the adherence check was not standardized. A related issue was the lack of standardized intervention evaluations and standardized feedback from the study participants. Feedback from observer professionals (two school counselors and one teacher) provided positive comments such that the information provided fit the needs of the participants. They

further highlighted that the psychoeducation was presented effectively and the attendees actively followed it, paying a sufficient level of attention. Parents' active participation in the Q&A session supported observers' evaluations. General participant evaluations were also positive at the end of the intervention. This feedback deserves credit considering its congruence with the available information in the literature concerning in-person information delivery methods followed by an open Q&A (VanVoorhis et al., 2023). However, no standardization was followed for these evaluations.

As a fourth limitation, the study is the first step in developing a broader and more feasible intervention against the caregiver burden in parents related to children's gaming behavior. Even though the study results imply the utility of a shorter intervention compared to the available studies in the literature (Hülquist et al., 2022), a direct experimental comparison is necessary to rule out confounding variables. Future studies are advised to modulate experimental conditions with the inclusion of differential treatment conditions, delivery methods, length, and participants. For instance, De Lepeleere et al. (2017) highlight that parental self-efficacy related to screen time and gaming is more open to change in parents of 6-9-year-olds compared to parents of 10-12-year-olds. They argue that parents with younger children may be more in search of better practices for their everyday lives. Also, interventions starting when the child is younger may be more effective regardless of the treatment content (Kuss & Griffiths, 2012).

As another point, a wide array of variables was not included in the current dataset. Research with public institutions defines an extra burden on the everyday demands at these institutions. So, active collaboration with public institutions may require lowering the number of variables to start collaborations. This tactic helps researchers to be active in the field, albeit decreasing the research validity. For instance, adding measures of affect and well-being might have produced a more detailed portrait. They were not included in the current study because time constraints at the institution obliged the researchers to restrict the number of variables. Researchers may focus on these variables in the future. Complementarily, supporting professionals to apply research methods in their everyday practices may lower time and energy costs leading to more comprehensive research designs. This may advance research soundness and professional competence collectively.

Another unmeasured variable was the severity of gaming in the current study. The attendees were welcomed regardless of the existence of a diagnosis related to gaming. This was because of the issues related to diagnosis, holistic support instead of a treatment protocol. Nevertheless, more than a quarter of the participants self-evaluated their children's situation as potentially disordered. The sample may therefore be composed of heterogeneous participants who need preventive, curative, rehabilitative, and health-promoting interventions. Furthermore, the literature discusses possible typologies of gamers depending on the triggers and the underlying mechanisms of need satisfaction (Lee et al., 2017). Accordingly, analyzing what works for whom, when, and

under what circumstances will be a valuable line of inquiry for future studies.

Last but not least, the study was conducted with senior undergraduate students as part of their curricula. The intervention was effective when implemented with future professionals. Future studies may analyze the comparative effectiveness of supervised student preprofessionals as providers of public psychoeducational interventions.

Collectively, the study findings suggest that even a 90-minute one-shot intervention may affect the psychological distress levels of parents of gamers even though more effort may be needed to affect the perceived parental self-efficacy. These findings are of value when the study findings that report similar power for individual and parental factors to explain child and adolescent problematic gaming are considered (Nielsen et al., 2020). So, intervening in parental factors may produce expected outcomes for parents and their children as the current pilot findings suggest. Pilot studies are important to provide a time- and cost-effective theoretical and methodological checkpoint for future studies. Future studies may benefit from the current study to design methodologically rigorous studies with higher effect sizes.

The current study offers the first study with a holistic parental intervention for parents of gamers. However, the current state-of-the-art for parent-focused studies in gaming literature is in its infancy. Games- and gaming-related measures focus on the child actor and there is no available measure to understand parents' experience and perspective on the gaming behavior of their children (Birol & Birol, 2022). So, the current study provides a first step to develop a broader and more feasible intervention against the caregiver burden in parents of gamers, which is significant for the field in understanding parents' perspectives. Gaming literature overlooks parents' (e.g., caregivers') experiences and the caregiver burden literature overlooks issues related to gaming. Therefore, the current study targets a neglected study topic and is expected to support the future of the field as a pilot intervention study.

The study has practical implications for professionals. It underlines the significance of holistic perspectives to have an in-depth understanding of mental health-related problems. It reminds professionals of the merits of collaborating with the immediate surroundings of children to understand and intervene in their behavior patterns. The study underlines the opportunities of mobilizing preprofessionals actively in the field. Engagement with preprofessionals may be helpful for clinicians.

Future studies may consider utilizing larger and more heterogeneous samples concerning socioeconomic status (low to high) and parental role (mothers and fathers) to increase generalizability of the findings. Validating the protocol with parents who parent different age ranges may be a fruitful research area. Applications with parents whose children present with differential severity levels for gaming may be informative to tailor the program for the general public, at-risk groups, and clinical groups. Study

variables may include affect and well-being among others. Scientific rigor may be enhanced with randomized control studies that include intervention, active- and passive-control groups. Development of a gaming-specific parental efficacy measure may be prioritized. Future studies may consider applying standard forms to measure treatment adherence. Also, variables related to intervention providers such as field of expertise, professional experience, etc. may be critically analyzed.

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Author contributions

Conception and design: N.T.; Data acquisition: N.T.; Data analysis: N.T.; Data interpretation: N.T.; Drafting of the manuscript: N.T.; Critical revision of the manuscript: N.T. The author reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Istanbul University Ethics Committee for Social Sciences and Humanities (Date: November 27, 2023, Decision/Protocol No: 2023/387). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The author declares that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The author declares that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed). American Psychiatric Association Publishing. [\[Crossref\]](#)
- Bender, P. K., Kim, E. L., & Gentile, D. A. (2020). Gaming disorder in children and adolescents: Risk factors and preventive approaches. *Current Addiction Reports*, 7(4), 553-560. [\[Crossref\]](#)
- Birmingham City University. (2017). *Statistical methods - Scale reliability analysis with small samples*. https://www.open-access.bcu.ac.uk/6077/1/_staff_shares_storage%20500mb_Library_ID112668_Stats%20Advisory_New%20Statistics%20Workshops_17ReliabilityAnalysis_ReliabilitySmallSamples3.pdf
- Birol, S. Ş., & Birol, E. (2022). Ebeveynlerin dijital oyun içeriklerine dair farkındalık düzeyleri ve bilgi birikimlerinin mevcut ölçme araçları ile ölçümü. *Bağımlılık Dergisi*, 23(4), 530-535. [\[Crossref\]](#)
- Bonnaire, C., Liddle, H. A., Har, A., Nielsen, P., & Phan, O. (2019). Why and how to include parents in the treatment of adolescents presenting Internet gaming disorder?. *Journal of Behavioral Addictions*, 8(2), 201-212. [\[Crossref\]](#)
- Borges, G., Orozco, R., Benjet, C., Martínez, K. I. M., Contreras, E. V., Pérez, A. L. J., Cedrés, A. J. P., Uribe, P. C. H., Couder, M. A. C. D., Gutierrez-Garcia, R., Chávez, G. E. Q., Albor, Y., Mendez, E., Medina-Mora, M. E., Mortier, P., & Ayuso-Mateos, J. E. (2020). (Internet) Gaming Disorder in DSM-5 and ICD-11: A case of the glass half empty or half full:(Internet) Le trouble du jeu dans le DSM-5 et la CIM-11: Un cas de verre à moitié vide et à moitié plein. *Canadian Journal of Psychiatry*, 66(5), 477-484. [\[Crossref\]](#)
- Caprara, G. V., Regalia, C., Scabini, E., Barbaranelli, C., & Bandura, A. (2004). Assessment of filial, parental, marital, and collective family efficacy beliefs. *European Journal of Psychological Assessment*, 20(4), 247-261. [\[Crossref\]](#)
- De Lepeleere, S., De Bourdeaudhuij, I., Cardon, G., & Verloigne, M. (2017). The effect of an online video intervention 'Movie Models' on specific parenting practices and parental self-efficacy related to children's physical activity, screen-time and healthy diet: A quasi experimental study. *BMC Public Health*, 17(1), 366. [\[Crossref\]](#)
- Demir, S., & Gündüz, B. (2014). Ebeveyn Yetkinlik Ölçeği'nin uyarlanması: Geçerlik ve güvenirlik çalışmaları. *Mustafa Kemal Üniversitesi Sosyal Bilimler Enstitüsü Dergisi*, 11(25), 309-322.
- Feindel, H. (2019). *İnternet bağımlılığı: Bağımlılar ve aileleri için el kitabı*. İletişim Yayınları.
- Gentile, D. (2009). Pathological video-game use among youth ages 8 to 18: A national study. *Psychological Science*, 20(5), 594-602. [\[Crossref\]](#)
- Griffiths, M. D., van Rooij, A. J., Kardefelt-Winther, D., Starcevic, V., Király, O., Pallesen, S., Müller, K., Dreier, M., Carras, M., Prause, N., King, D. L., Aboujaoude, E., Kuss, D. J., Pontes, H. M., Lopez Fernandez, O., Nagygyorgy, K., Achab, S., Billieux, J., Quandt, T., ... Demetrovics, Z. (2016). Working towards an international consensus on criteria for assessing internet gaming disorder: A critical commentary on Petry et al. (2014). *Addiction*, 111(1), 167-175. [\[Crossref\]](#)
- Gruchel, N., Kurock, R., Bonanati, S., & Buhl, H. M. (2022). Parental involvement and children's internet uses - relationship with parental role construction, self-efficacy, internet skills, and parental instruction. *Computers and Education*, 182, 104481. [\[Crossref\]](#)

- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the depression anxiety stress scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227-239. [\[Crossref\]](#)
- Hidaayah, N., Yunitasari, E., Kusnanto, K., Nihayati, H. E., Santy, W. H., Putri, R. A., & Rahman, F. S. (2022). Parenting in the prevention of internet gaming addiction. *Open Access Macedonian Journal of Medical Sciences*, 10(G), 731-738. [\[Crossref\]](#)
- Hülquist, J., Fangerau, N., Thomasius, R., & Paschke, K. (2022). Resource-strengthening training for parents of adolescents with problematic gaming (Res@tP): A clinical pilot study. *International Journal of Environmental Research and Public Health*, 19(15), 9495. [\[Crossref\]](#)
- Kim, H. S., Son, G., Roh, E. B., Ahn, W. Y., Kim, J., Shin, S. H., Chey, J., & Choi, K. H. (2022). Prevalence of gaming disorder: A meta-analysis. *Addictive Behaviors*, 126, 107183. [\[Crossref\]](#)
- King, D. L., Delfabbro, P. H., Wu, A. M. S., Doh, Y. Y., Kuss, D. J., Pallesen, S., Mentzoni, R., Carragher, N., & Sakuma, H. (2017). Treatment of internet gaming disorder: An international systematic review and CONSORT evaluation. *Clinical Psychology Review*, 54, 123-133. [\[Crossref\]](#)
- Krossbakken, E., Torsheim, T., Mentzoni, R. A., King, D. L., Bjorvatn, B., Lorvik, I. M., & Pallesen, S. (2018). The effectiveness of a parental guide for prevention of problematic video gaming in children: A public health randomized controlled intervention study. *Journal of Behavioral Addictions*, 7(1), 52-61. [\[Crossref\]](#)
- Kuss, D. J., & Griffiths, M. D. (2012). Online gaming addiction in children and adolescents: A review of empirical research. *Journal of Behavioral Addictions*, 1(1), 3-22. [\[Crossref\]](#)
- Lane, C., Carson, V., Morton, K., Reno, K., Wright, C., Predy, M., & Naylor, P. J. (2021). A real-world feasibility study of the PLAYshop: A brief intervention to facilitate parent engagement in developing their child's physical literacy. *Pilot and Feasibility Studies*, 7(1), 113. [\[Crossref\]](#)
- Lee, S. Y., Lee, H. K., & Choo, H. (2017). Typology of internet gaming disorder and its clinical implications. *Psychiatry and Clinical Neurosciences*, 71(7), 479-491. [\[Crossref\]](#)
- Liu, Q. X., Fang, X. Y., Yan, N., Zhou, Z. K., Yuan, X. J., Lan, J., & Liu, C. Y. (2015). Multi-family group therapy for adolescent Internet addiction: Exploring the underlying mechanisms. *Addictive Behaviors*, 42, 1-8. [\[Crossref\]](#)
- Macur, M., & Pontes, H. M. (2021). Internet Gaming Disorder in adolescence: Investigating profiles and associated risk factors. *BMC Public Health*, 21(1), 1547. [\[Crossref\]](#)
- Masarik, A. S., & Conger, R. D. (2017). Stress and child development: A review of the Family Stress Model. *Current Opinion in Psychology*, 13, 85-90. [\[Crossref\]](#)
- Nielsen, P., Christensen, M., Henderson, C., Liddle, H. A., Croquette-Krokar, M., Favez, N., & Rigter, H. (2021). Multidimensional family therapy reduces problematic gaming in adolescents: A randomised controlled trial. *Journal of Behavioral Addictions*, 10(2), 234-243. [\[Crossref\]](#)
- Nielsen, P., Favez, N., & Rigter, H. (2020). Parental and family factors associated with problematic gaming and problematic internet use in adolescents: A systematic literature review. *Current Addiction Reports*, 7(3), 365-386. [\[Crossref\]](#)
- Olson, C. L. (1976). On choosing a test statistic in multivariate analysis of variance. *Psychological Bulletin*, 83(4), 579-586. [\[Crossref\]](#)
- Rehbein, F., & Baier, D. (2013). Family-, media-, and school-related risk factors of video game addiction: A 5-year longitudinal study. *Journal of Media Psychology*, 25(3), 118-128. [\[Crossref\]](#)
- Schneider, L. A., King, D. L., & Delfabbro, P. H. (2017). Family factors in adolescent problematic internet gaming: A systematic review. *Journal of Behavioral Addictions*, 6(3), 321-333. [\[Crossref\]](#)
- Sharma, M. K. (2016). Video game addiction and life style changes: Implications for caregivers burden. *Indian Journal of Psychological Medicine*, 38(2), 150-151. [\[Crossref\]](#)
- Tengilimoğlu, D., Işık, O., & Akbolat, M. (2017). *Sağlık işletmeleri yönetimi*. Nobel Kitabevi.
- VanVoorhis, R. W., Miller, K. L., & Miller, S. M. (2023). A single-session intervention designed to promote resilience for parents of children with disabilities. *Journal of Child and Family Studies*, 32(8), 2406-2418. [\[Crossref\]](#)
- Wartberg, L., Kriston, L., & Thomasius, R. (2017). The prevalence and psychosocial correlates of internet gaming disorder. *Deutsches Ärzteblatt International*, 114(25), 419-424. [\[Crossref\]](#)
- World Health Organization. (2021). *ICD-11: International statistical classification of diseases and related health problems* (11th ed). <https://icd.who.int/>
- Yıldırım, S., Yalçın, N., & Güler, C. (2017). Caregiver burden in chronic mental illness: A systematic review. *Journal of Psychiatry Nursing*, 8(3), 165-171. [\[Crossref\]](#)
- Yılmaz, Ö., Boz, H., & Arslan, A. (2017). Depresyon anksiyete stres ölçeğinin (DASS 21) Türkçe kısa formunun geçerlilik-güvenilirlik çalışması. *Finans Ekonomi ve Sosyal Araştırmalar Dergisi*, 2(2), 78-91.

Psychometric validity and reliability of the Turkish exercise addiction inventory-3

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Abstract

The Exercise Addiction Inventory-3 is the latest version of the Exercise Addiction Inventory, whose use has become more frequent in several countries. The present study investigated its psychometric properties among Turkish adults. The study recruited 389 participants through online social media platforms. Reliability was tested through Cronbach's alpha and McDonald's omega. Validity was tested through correlations among the Exercise Addiction Inventory-3 score and scores on the Exercise Dependence Scale-Revised, Ten-Item Personality Inventory, SCOFF Questionnaire, and Obsessive-Compulsive Inventory-Revised. Structural validity was tested via confirmatory factor analysis and measurement invariance. The findings suggested that the Turkish version of the Exercise Addiction Inventory-3 is reliable. Moreover, confirmatory factor analysis indicated that the models demonstrated good to excellent fit indices. Partial measurement invariance was observed. The Exercise Addiction Inventory-3 scores were positively correlated with the Exercise Dependence Scale-Revised and Obsessive-Compulsive Inventory-Revised scores. The total scale score and the Addiction Tendency subscale score were negatively correlated with SCOFF scores but not the Health Relevance subscale scores. The Turkish Exercise Addiction Inventory-3 is a reliable and valid instrument to assess the risk of exercise addiction that differentiates at-risk groups from passionate exercisers. Implications for future studies are discussed.

Keywords: behavioral addiction, confirmatory factor analysis, Exercise Addiction Inventory, psychometric evaluation

Main points

- The study assessed both the reliability and validity of the Turkish Exercise Addiction inventory-3 (EAI-3).
- The EAI-3 has good psychometric properties, showing reliability and validity for assessing the risk of exercise addiction.
- Confirmatory factor analysis indicates that the models had good to excellent fit indices, with partial measurement invariance observed between female and male exercisers.
- The EAI-3 scores positively correlate with scores on the Exercise Addiction Scale-Revised and Obsessive-Compulsive Inventory-Revised and negatively correlate with scores on the SCOFF Questionnaire.
- The Turkish EAI-3 is a valid tool for assessing exercise addiction and distinguishing at-risk groups from passionate exercisers.

Introduction

Exercise addiction (EA) can be conceptualized as a behavioral addiction that involves a persistent pattern of exercise leading to negative consequences on an individual's physical (e.g., injuries), psychological, and social well-being (e.g., decreased

social interactions; Adams & Kirkby, 2001). Empirical evidence suggests that EA has characteristics of psychological dependence (e.g., withdrawal-like symptoms and cravings) that are experienced in substance addictions as well as in gambling or gaming addictions (Freimuth et al., 2011). However, the *Diagnostic and Statistical Manual of Mental*

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Disorders, fifth edition text revision (DSM-5-TR; [xRef no="3"] American Psychiatric Association [APA], 2022[xRef]), the standard diagnostic text used by mental health professionals, does not yet include exercise addiction as a formal diagnostic category due to insufficient scientific evidence for diagnostic standards and uniformity in etiology (Szabo & Demetrovics, 2022).

One challenge that hinders the establishment of a standardized diagnostic framework is the heterogeneity in EA (Weinstein & Szabo, 2023). Exercise addiction can be classified as primary or secondary. Primary exercise addiction is when the rewarding effects stem directly from exercise behavior, whereas secondary exercise addiction, better conceptualized as instrumental exercise, refers to exaggerated exercise to gain a reward that is not related to exercise, such as weight loss or building a muscular body (Szabo & Demetrovics, 2022). However, as discussed by Colledge et al. (2020), sometimes the difference between the types of exercise addiction or the frequency of diagnosis can be biased. In fact, some studies either fail to assess the prevalence of eating disorders among individuals engaging in excessive exercise or deliberately exclude participants with eating disorder symptoms to focus solely on those meeting the criteria for primary exercise addiction.

The other difficulty in EA research is that engaging in high levels of exercise is a combination of commitment and passion, which blurs the line between healthy and unhealthy (Szabo, 2018). The detection of such a threshold is mandatory in the diagnostic phase. Therefore, it is crucial to develop a scale that is accurate and valid for assessing exercise addiction so that researchers and clinicians can identify individuals not only "at risk" but also screen those suffering from exercise-related dysfunction (Granzio et al., 2023).

During the past few decades, various instruments have been developed. Two of the most widely used are the Exercise Dependence Scale (EDS-R; Hausenblas & Downs, 2002) and the Exercise Addiction Inventory (EAI; Terry et al., 2004). Recently, an expanded EAI version (EAI-3; Granzio et al., 2023) was developed to assess exercise addiction more sensitively.

In their comparative study of the psychometric characteristics of the EDS-R and EAI, Mónok et al. (2012) noted that both instruments are reliable and sensitive enough to assess and differentiate addiction levels among exercisers, with interesting commonalities in the assessed symptoms (e.g., tolerance, withdrawal, and modification; Gault et al., 2023). In recent years, the EAI has also been revised to assess more aspects of EA. Granzio et al. (2023) proposed a new version (i.e., EAI-3) investigating aspects such as feelings of guilt accompanied by exercise addiction and the tendency to exercise regardless of injury, perhaps not following medical advice. The EAI-3 has several advantages: a more straightforward classification (i.e., being at risk or not), as determined by the total score; and a two-factor structure (i.e., Addiction Tendency and Health Relevance subscales), helping the user to consider both pathological and healthy/passion-related sides of exercise (Granzio et al., 2023).

Although the EAI-3 has been validated in several languages, neither its reliability nor its validity have been formally evaluated among Turkish samples. Therefore, the present study addressed this research gap. Firstly, good psychometric properties in terms of the Turkish EAI-3's reliability and validity (H1) were expected. Moreover, it was also hypothesized that the Turkish EAI-3 would have a two-factor structure (H2), that the scale would demonstrate measurement invariance between female and male exercisers (H3), and that the previously established cutoff score (i.e., 34) suggesting the risk of exercise addiction would be found among Turkish adults (H4).

Material and Methods

Participants

Individuals aged 18 years and over who exercised for an average of 150 minutes at least three days per week and had maintained regular physical activity for at least six months were eligible to be included in the study. These criteria, which are coherent and in line with the World Health Organization's (2020) definition of regular exercisers, were used to include all the exercises that regular exercisers did or trained themselves in sports or physical activity. This definition has also been used in prior studies (e.g., Huang et al., 2019) and excludes individuals who do not regularly exercise or whose training/exercise rate is not enough to make them prone to exercise addiction. The exclusion criteria were being aged below 18 years, not exercising at least three times weekly, not exercising for at least 150 minutes per session, and not exercising regularly for at least six months.

Measures

Demographic Information

The initial sample comprised 449 participants. The final sample comprised 389 participants (60.15% male; *M*age = 27.12 years; *SD* = ±8.81; age range = 18-56 years; age data missing for 41 participants). The sample comprised 155 female participants (39.89%) and 234 male participants (60.15%). More demographic information can be found in the Supplementary Material.

Expanded Exercise Addiction Inventory

The EAI-3 is an eight-item questionnaire (e.g., "*Concerns have arisen between me and my family and/or my partner about the amount of exercise I do*"). Items are rated on a six-point Likert scale ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). The EAI-3 includes the Health Relevance (HR) and Addiction Tendency (AT) subscales (Granzio et al., 2023). Total scores range from 8 to 54. Adaptation to the Turkish language was conducted according to the standard translation-back translation procedure (Beaton et al., 2000).

All the items and their assignment to each subscale are in the Appendix.

Exercise Dependence Scale-Revised

The EDS-R (Hausenblas & Downs, 2002; Turkish version: Yeltepe & İkizler, 2007) comprises 21 items and seven sub-dimensions. The items were based on DSM-IV substance addiction criteria. Each item (e.g., *"I continually increase my exercise intensity to achieve the desired effect/benefits"*) is scored on a six-point Likert scale, ranging from 1 (*never*) to 6 (*always*). The total scores range from 21 to 126. Higher scores indicate a greater risk of exercise dependence.

The SCOFF Questionnaire

The five-item SCOFF (sick, control, one stone, fat, and food) Questionnaire (Morgan et al., 1999; Turkish version: Aydemir et al., 2015) was used to assess the risk of developing an eating disorder. Each item (e.g., *"Do you make yourself sick because you feel uncomfortably full?"*) is answered either "yes" or "no" (a "yes" scores 1-point). Scores greater than 2 (out of 5) suggest a positive screening for a potential eating disorder.

Obsessive-Compulsive Inventory-Revised

The OCI-R (Abramowitz & Deacon, 2006; Yorulmaz et al., 2015) was used to assess obsessive and compulsive symptoms. The inventory comprises 18 items and 6 subscales evaluating washing, checking, ordering, obsessing, hoarding, and neutralizing symptoms. Each item (e.g., *"I am upset by unpleasant thoughts that come into my mind against my will"*) is scored on a five-point scale from 0 (*not at all*) to 4 (*extremely*). The range of the total score is 0-72, with higher scores suggesting more severe OCD symptoms.

Ten-Item Personality Inventory

The Ten-item Personality Inventory (TIPI) (Gosling et al., 2003; Turkish version: Atak, 2013) was used to assess five personality traits, namely extraversion, conscientiousness, agreeableness, openness to experience, and emotional stability (two items for each trait). Each item (e.g., *"I see myself open to new experiences, complex"*) is scored on a seven-point scale from 1 (*disagree strongly*) to 7 (*agree strongly*). The psychometric properties of all the scales (excluding EAI-3) are in the supplementary materials.

Procedure

Data were collected through an online survey disseminated via social media platforms. More specifically, recruitment posts were shared on *Facebook*, *Instagram*, and *Twitter*. The recruitment strategy targeted public and private groups,

pages, and forums with a clear affiliation to sports, fitness, and exercise-related interests (e.g., amateur sports teams, fitness communities, and exercise science discussion groups). These groups were selected based on their thematic relevance and high likelihood of participation from individuals who regularly engage in physical activity. To enhance sample diversity and increase participation, a snowball sampling approach was also implemented. Upon completing the survey, participants were invited to share the survey link with acquaintances or peers who also engaged in regular exercise. This strategy aimed at reaching a broader population of exercisers beyond the initial distribution channels.

The survey was conducted on the *Qualtrics* research platform. After obtaining written consent, the participants were informed about the general study idea. Participants were free to quit the study at any point. They were informed that their data would be processed anonymously. Participants were not paid or rewarded in any way for their participation. The study received ethics committee approval (University of Padova, code: 18F7D86802A124B1E783A3074ED80641).

Data Analysis

Because the structure of the EAI-3 was previously identified by Granzio et al. (2023), only a confirmatory approach (i.e., CFA) was used. Moreover, measurement invariance based on biological sex, reliability, and validity analyses were performed. The R statistical software was used to run all analyses and the *lavaan* package for the CFA models.

Confirmatory Factor Analysis and Measurement Invariance

To obtain more robust results, standard errors, and mean adjusted test statistics, a robust version of the maximum likelihood estimator method was used. The model's fit was assessed through the comparative fit index (CFI: estimates ≥ 0.95 for a good fit, estimates ≥ 0.90 for an adequate fit, while estimates < 0.90 suggesting a non-acceptable fit); and the root mean square error of approximation (RMSEA: estimates ≤ 0.05 indicate a good fit, estimates between 0.05 and 0.10 an adequate fit, and estimates > 0.10 a non-acceptable fit).

Measurement invariance (MI in the sequel) of the item scores was tested to understand whether biological sex might influence the participants' responses. As a first step, a baseline model was tested to examine the fundamental structure of the EAI-3. Then, configural, metric, and scalar models were tested. Both the difference (Δ) between fit indices of the models (CFI > 0.01 and an RMSEA > 0.015 indicated invariance violations) and the overall fit of each model were used as criteria to assess MI. Partial measurement invariance was tested whenever MI violations emerged by relaxing only the parameters related to the critical item(s).

Reliability, Validity and Cutoff, and Linear Models

Cronbach's alpha and McDonald's omega indices were used to evaluate reliability and internal consistency. For both indices, a value ≥ 0.70 suggests good reliability. The receiver operating characteristic (ROC) curve was adopted to assess both specificity and sensitivity of EAI-R. The EDS-R categorical score was used as a criterion to define the best EAI-3 cutoff. Both concurrent and convergent validity were assessed by using the Spearman correlation coefficient of both total scale and subscale scores with all the scales and subscale scores of the EDS-R OCI-R, SCOFF, and TIPI. All p -values were adjusted through a false discovery rate correction.

Finally, to check if other sample characteristics may relate to the risk of exercise addiction, three linear regression models were tested, with the EAI-3 total score as the response variable and three different predictors: the type of exercise (three levels: aerobic, anaerobic or both; model 1), type of exercise participation (three levels: individual, team or both; model 2), and purpose of exercise (physical/mental health, mastery or social; model 3). Because the frequencies of the predictors' levels may be very different, two precautions were adopted. First, *a priori* comparisons by using Helmert contrasts were used on each categorical variable. Helmert contrasts belong to a family of centered and orthogonal contrasts coding, where each level of a categorical variable is tested against the means of all the previous ones. With Helmert contrasts (and due to the orthogonality, see Granzio et al. (2025)) each comparison can be interpreted independently of the others. Therefore, it is possible to compare the levels with similar frequencies (first comparison), as well as the mean of the levels with similar frequencies with the mean of levels with the highest or the lowest frequencies. Secondly, the homoscedasticity of each model was tested before commenting on the results, using Levene's test. Whenever the assumption of homoscedasticity was violated, the model was not commented on.

Results

Confirmatory Factor Analysis and Measurement Invariance

From Table 1, it can be observed that all the CFA models (overall and MI) obtained good to excellent fit indices. Configural and metric invariance emerged, as suggested by the adequate fit indices. However, scalar invariance violations were observed. As suggested by modifications indices inspections, the intercept on Item 2 (*"Concerns have arisen between me and my family and/or my partner about the amount of exercise I do"*; MI = 19.278) was different between females and males. Males presented higher starting values on this item ($M = 2.68$; $F = 1.94$). Relaxing parameters related to this item led to an improvement of the model, but further scalar violation was found on Item 8 (*"I am inclined to train when [or before completely recovered from] illness or injury"*; MI = 8.214). More specifically, males had higher starting values on this item ($M = 3.76$; $F = 3.16$). Even in this case, item parameters relaxation led to a model improvement, but further scalar violation was

Table 1. Results of the confirmatory factor analysis on the assessment model composed of eight items

Model	CFI	RMSEA	Δ CFI	Δ RMSEA
Overall	0.982	0.041	–	–
TR-female	0.965	0.054	–	–
TR-male	0.991	0.031	–	–
Configural	0.982	0.042	–	–
Metric	0.988	0.031	0.006	0.011
Scalar	0.930	0.071	0.058	0.039
Scalar I2	0.960	0.054	0.028	0.023
Scalar I28	0.972	0.046	0.016	0.015
Scalar I128	0.980	0.039	0.008	0.008

Results of the CFA on the assessment model comprising eight items.

Note: CFI = Comparative fit index; RMSEA = Root mean square error of approximation; Δ = Difference; I2 = Invariance on item 2, I28 = Invariance on items 2 and 8; I128 = Invariance on items 1, 2, 8.

found on Item 1 (*"Exercise is the most important thing in my life"*; MI = 6.172). More specifically, males had higher starting values on this item ($M = 4.32$; $F = 4.02$). Relaxing parameters related to this item improved model fit, and no further violations were found.

Reliability

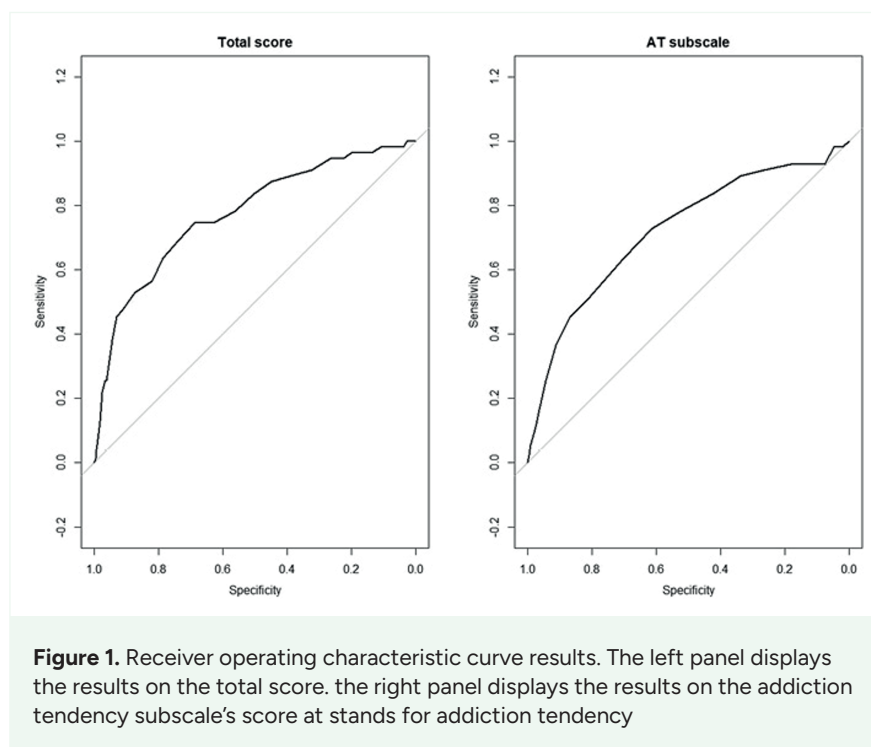
The EAI-3 overall scale scores obtained good internal consistency (Cronbach's $\alpha = 0.81$; McDonald's $\omega = 0.85$). Both HR (Cronbach's $\alpha = 0.74$; McDonald's $\omega = 0.76$) and AT subscales (Cronbach's $\alpha = 0.71$; McDonald's $\omega = 0.78$) had acceptable internal consistency.

Exercise Addiction Inventory-3 Cutoffs

Applying the EDS-R cutoff, 55 participants (14 F, 41 M) were identified as at risk of developing exercise addiction, while 334 participants (141 F, 193 M) were identified as not at risk. Based on this, ROC analysis suggested that a cutoff of 32.5 for the total score of the EAI-3 was sufficient to suggest a potential risk of exercise addiction (specificity: 0.688; sensitivity: 0.745; AUC: 0.774; see Figure 1, left panel). In regard to the AT subscale, a cutoff of 14.5 could be used to suggest an at-risk state (specificity: 0.613; sensitivity: 0.727; AUC: 0.722; Figure 1, right panel). Starting from this cutoff (i.e., considering total score), 55 respondents were screened as at risk of exercise addiction (14.13%).

Concurrent Validity, Convergent Validity, and Linear Models

Both total and subscale scores showed moderate to high correlation with EDS-R, suggesting adequate criterion validity. Positive correlations between EAI-3 scores and both SCOFF and OCI total scores (excluding HR subscales in the former case) were found, with AT scores having (in absolute value) a higher correlation with such scales. The HR subscale scores were positively correlated with agreeableness, conscientiousness, and openness scores on the TIPI.



Finally, the total EAI-3 score was positively associated with the openness score on the TIPI (see Table 2). No further statistically significant correlations were found.

In the linear model, Table 3 shows the descriptive statistics on the three predictors used for the three linear models: the exercise type (three levels: aerobic, anaerobic or both; model 1), type of exercise participation (three levels: individual, team or both; model 2), and purpose of exercise (physical/mental health, mastery or social; model 3). The difference in frequencies for at least one level in each variable was coherent with the analytic plan.

Levene's test did not show any significant deviations from homoscedasticity (model 1: $F(2, 386) = 0.88, p = .41$; model 2: $F(2, 386) = 0.09, p = .91$; model 3: $F(2, 386) = 1.78, p = .17$). In model 1, no differences were found comparing participants engaging in anaerobic vs. aerobic sport ($b = 1.45$; $SE = 0.95, t = 1.53, p = .13$). However, when comparing the average EAI-3 score of participants engaging in aerobic or anaerobic sports separately with the average EAI-3 score of participants engaging in both, the latter means emerged as significantly higher than the former ($b = 0.69$; $SE = 0.34, t = 2, p = .04$; left panel of Figure 2). In model 2, no differences were found in both comparisons (comparison 1: $b = 0.79$; $SE = 0.40, t = 1.81, p = .07$; comparison 2: $b = 0.31$; $SE = 0.32, t = 0.98, p = .32$; middle panel of Figure 2). Finally, in model 3, participants exercising for mastery purposes obtained higher average values of EAI-3 total scores compared to participants exercising for health purposes ($b = 1.63$; $SE = 0.37, t = 4.37, p < .01$; right panel of Figure 2), while no differences were found comparing participants exercising for social purposes to participants exercising for health and mastery purposes together ($b = -1.01$; $SE = 0.62, t = -1.63, p = .10$).

Table 2. The correlations between the eai-3 scores and scores on the other scales

EAI-3	Other Scales	p	p adj
EDSR_tot	HR	0.541	<.001
EDSR_tot	AT	0.546	<.001
EDSR_tot	EAI_tot	0.628	<.001
HR	OCIR_tot	0.178	.001
AT	OCIR_tot	0.300	<.001
EAI_tot	OCIR_tot	0.270	<.001
HR	SCOFF	0.087	.113
AT	SCOFF	0.171	.002
EAI_tot	SCOFF	0.153	.006
HR	Extraversion	0.090	.106
AT	Extraversion	-0.119	.0385
EAI_tot	Extraversion	-0.019	.743
HR	Agreeableness	0.149	.007
AT	Agreeableness	-0.050	.373
EAI_tot	Agreeableness	0.0679	.229
HR	Consciousness	0.1127	.048
AT	Consciousness	-0.097	.095
EAI_tot	Consciousness	0.003	.958
HR	Emotional stability	0.050	.373
AT	Emotional stability	-0.100	.095
EAI_tot	Emotional stability	-0.025	.676
HR	Openness	0.238	<.001
AT	Openness	0.092	.105
EAI_tot	Openness	0.195	<.01

Bonferroni adjustment method was used.

Note: p = Spearman's correlation coefficient; p adj = Adjusted p-value; AT = Addiction tendency subscale; EAI = Exercise addiction scale; EDSR = Exercise dependence scale-revised; HR = Healthy relevance subscale; OCIR = Obsessive-compulsive inventory-revised; SCOFF = SCOFF Questionnaire.

Table 3. Descriptive statistics of the categorical variables as predictors of the linear models on eai total scores

Characteristic	Level	N	Mean	SD	Median	Min	Max
Sport type	Aerobic	46	27.04	6.18	27	13	43
Sport type	Anaerobic	21	29.95	7.53	30	11	43
Sport type	Mixed	322	30.57	7.33	31	8	48
Individual/team	Individual	210	29.36	7.19	29	10	48
Individual/team	Team	101	30.95	7.58	32	10	48
Individual/team	Both	78	31.08	7.02	31	8	46
Purpose	Health	221	28.89	7.41	29	8	45
Purpose	Mastery	153	32.16	6.59	32	10	48
Purpose	Social	15	27.47	8.01	27	13	44

Note: Max = Maximum; Min = Minimum; SD = Standard Deviation.

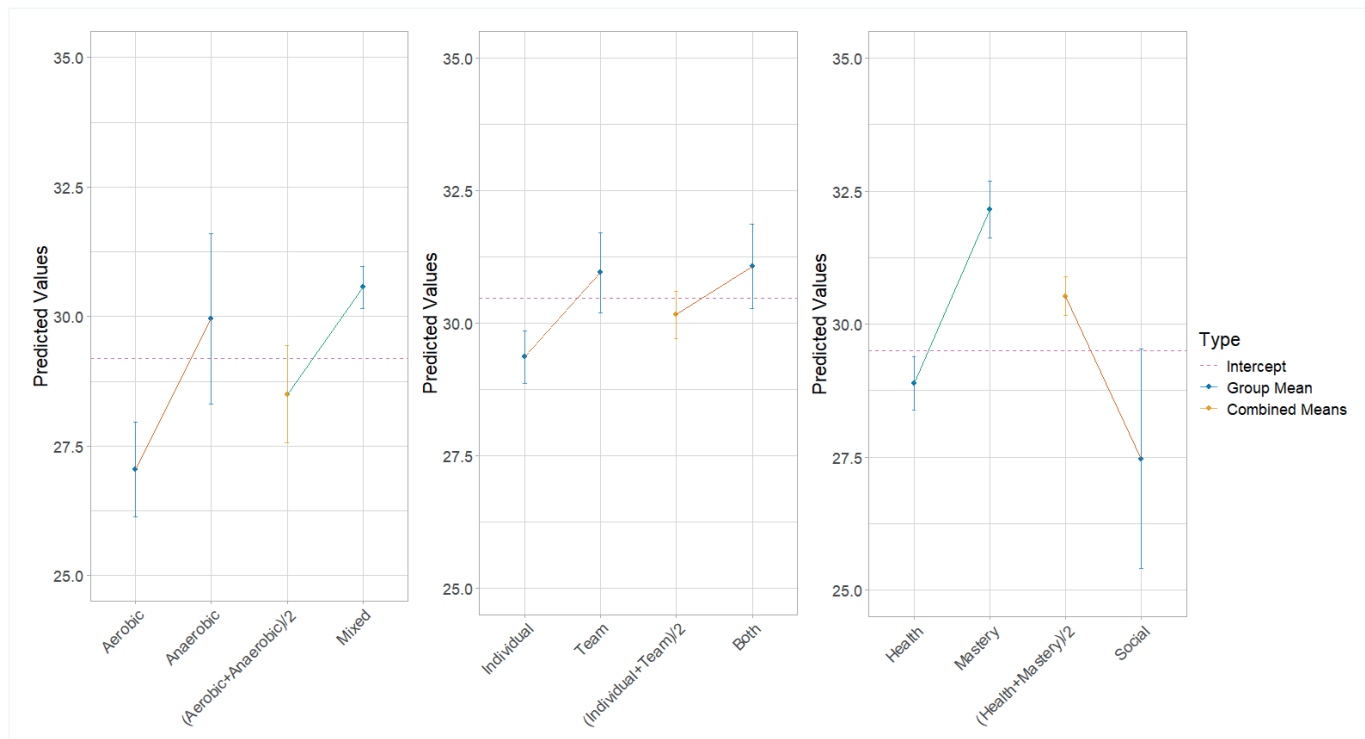


Figure 2. This graphical representation depicts three linear models, with type of practiced sport (model 1, left panel), attendance of individual or other sports (model 2, middle panel), and purpose of exercising (model 3, right panel) as the categorical predictors (levels are represented on the x-axis), and EAI-3 total scores as the dependent variable of each model (values are shown on the y-axis). The applied contrast type is Helmert. In this type of contrast, each group mean is compared to the cumulative means of all previous groups. Blue dots represent the expected values (means) for the cumulative means, while orange dots represent the expected values (means) for each individual group. Error bars indicate 95% confidence intervals. Green lines highlight significant contrasts, with 0.05 serving as the threshold for the first type of error. Orange lines highlight non-significant contrasts

Discussion

Because its definition and assessment are still developing, exercise addiction is not yet formally recognized as a mental health disorder. Numerous scales are available that assess problematic exercise, and these have been validated in multiple languages. The Turkish EAI was only recently validated (Aydın et al., 2023). Since then, the EAI-3 has been developed, and the present study investigated both the reliability and validity of the EAI-3 among Turkish adults, and the results

showed it had good psychometric properties (supporting H1). The overall reliability analysis of the Turkish EAI-3 indicated adequate to very good reliability for both the overall scale and its two subscales.

In addition, the internal consistency coefficients obtained in the analysis align with those reported in Granzio et al.'s (2023) original validation study, where the total scale demonstrated adequate internal consistency ($\alpha = 0.81$; $\omega = 0.84$). An acceptable internal consistency was found for both the HR

subscale ($\alpha = 0.70$; $\omega = 0.74$) and the AT subscale ($\alpha = 0.71$; $\omega = 0.78$). The second hypothesis concerned the two-factor structure of the EAI-3. The confirmatory factor analysis (CFA) confirmed the two-factor structure of the EAI-3 among Turkish individuals (supporting H2), with one factor assessing HR and the other assessing AT. One of the main challenges that remains is distinguishing healthy, passionate physical activity from exercise addiction when both addicted and passionate participants use the scale. Differentiating between passionate and addicted individuals would allow for the EAI-3's further use in clinical screening and better identification of people truly at risk of EA, thereby reducing the possibility of false positives.

In the present study, violations of scalar invariance were observed for EAI-3 Item 1 (*"Exercise is the most important thing in my life"*), Item 2, (*"Concerns arose between me and my family and/or partner about the amount of exercise I do"*), and item 8 (*"I am inclined to train when (or before) completely recovering from illness or injury"*), indicating a lack of invariance in the item responses across gender (initially not supporting H3). The violation indicated that the intercepts differed between males and females for all items listed, with males having higher starting values than females. After the parameters were relaxed, measurement invariance across gender was established, indicating that the scale performed equally well for both male and female participants among Turkish individuals (supporting H3). These potential differences between Turkish males and females can be interpreted from several perspectives.

First, Item 1 may reflect the commitment of Turkish males to sports. However, on a broader scale, family plays a central role in Turkish culture, and females are generally expected to take on more and various responsibilities within the family than males. Despite having the same level of commitment to sports, Turkish females may feel more societal pressure to prioritize family and/or their partners, leading them to score lower on Item 1 than their male counterparts. Furthermore, Item 1 of the EAI-3 was also associated with measurement invariance in the original study (Granziol et al., 2023). This might indicate that the content of Item 1 is not ideal for capturing the salience component of exercise addiction.

Secondly, for Item 2, the difference observed between females and males could be explained by the fact that males generally have higher physical endurance than females and, therefore, can exercise more frequently, which might influence the amount of time spent exercising (Högström et al., 2012). Additionally, it should be noted that among the general Turkish population, the level of physical activity is generally lower among females than males (Daşkapan & Atalay, 2013).

Lastly, for Item 8, in Turkish culture, gender stereotypes suggest that males should be strong, ambitious, and brave (Sakallı & Kuzlak, 2018). Consequently, males might challenge themselves more to fulfill these stereotypes than their female counterparts, leading them to return to exercising before fully recovering or to exercise while still injured.

The last hypothesis of the present study (H4) was that the internationally recognized cutoff score of the EAI-3 (i.e., a total score of 34) would be expected to have a good fit for the Turkish data. However, the results of this study did not support this hypothesis. Instead, the results of the study determined a Turkish cutoff score one point lower than the original study (Granziol et al., 2023). This indicates that the psychometric properties of the Turkish EAI-3 may differ slightly from the original version. The sensitivity value in the present study might be related to the sample's demographics, such as age, which was not controlled for. Therefore, studies with larger numbers of participants are needed to achieve more consistent results. Because exercise addiction is still an evolving field of research, a cross-culturally comparable cutoff score can play a pivotal role in solidifying the foundation of exercise addiction and its potential diagnostic properties in the future.

Regarding the relationship between the EAI-3 and other scales, the EAI-3 indicated concurrent validity with the EDS-R, indicating that the EAI-3 appears to capture the same construct as the EDS-R and therefore has good concurrent validity. Additionally, a positive correlation was observed between AT, one of the two factors of the EAI-3, and the SCOFF. Unlike the original study (Granziol et al., 2023), no correlation was found between the HR factor and SCOFF. This may suggest that when sport and exercise are perceived through their impact on health or as elevated passion, the relationship with the risk of eating disorders is difficult to identify. However, the relationship between the total EAI-3 score and its pathological scale scores and the SCOFF showed a significant positive correlation, consistent with the established relationship between exercise addiction and eating disorders in the literature (Shroff et al., 2006; Cook et al., 2015). Trott et al. (2021) reported in their meta-analysis that exercise addiction occurs more frequently among individuals with eating disorders than those without. Similarly, Zeulner et al. (2016) found that 44.4% of participants who scored positively on the EAI were also at risk for developing an eating disorder.

Another result from the present study was that the EAI-3 and its subscales did not correlate with neuroticism, which is defined as emotional instability and heightened stress response resulting in frequent negative emotions. This result contradicts the study by Remilly et al. (2023), in which participants reported higher levels of neuroticism correlated with higher EDS-R scores, whereas Costa and Oliva (2012) found that emotional (in)stability (neuroticism) negatively correlated with exercise addiction. This discrepancy may stem from differences in instruments and sample characteristics between studies. It may also suggest that the EAI-3 captures different profiles and patterns of exercise addiction.

Scores on one of the subscales of the EAI-3, AT, were positively correlated with scores on the Obsessive-Compulsive Inventory-Revised (OCI-R). Gulker et al. (2001) reported that excessive exercisers exhibited higher rates of obsessive-compulsive symptoms, such as an association between eating disorders and obsessive-compulsive traits (Lichtenstein et al.,

2017). This is consistent with the correlation observed between the pathological factor in the factorial structure of the EAI-3 and the OCI-R in the present study. Additionally, in the study by Meyer et al. (2021), 31.3% of individuals with exercise addiction had obsessive-compulsive disorders, and 25% of individuals had obsessive-compulsive personality disorder. This comorbidity with several other diagnoses supports the idea that exercise addiction is a separate construct from eating disorders, but somehow related to other disorders. Based on this, obsessive-compulsive spectrum disorders and behavioral addictions may be important because of their strong emphasis on problematic and repetitive behaviors (Starcevic, 2016).

Finally, interesting results emerged from linear models on EAI-3 total scores and type of exercise engaged in, suggesting that individuals engaged in mixed sports (i.e., aerobic and anaerobic) may be more prone to the risk of exercise addiction than individuals engaging in aerobic or anaerobic activities separately, as suggested by higher total scores in the former group. This may be explained by considering the amount of exercise and time necessary to engage simultaneously in both anaerobic and aerobic sports, factors that may increase the chance of converting a passion into an addiction. Results of the present study also suggested that individuals exercising to master sports at higher levels may be at greater risk of exercise addiction compared to individuals exercising for physical or mental health purposes. These results are in line with studies investigating the edge between passion for exercise and exercise addiction (Szabo & Kovacsik, 2019).

Limitations and Future Research

Some limitations should be mentioned. Data were collected through online self-report measures, which may limit control over the data collection process due to variations in participants' environments, such as interruptions during the test, potentially affecting response times, and the inability to resolve possible misunderstandings about the questions. Specific exclusion criteria were applied to the data collected. For example, removing participants with a survey completion time lower than seven minutes on average is thought to help improve the overall quality of the data. Moreover, the test-retest reliability of the Turkish version of the EAI-3 was not explicitly assessed. Future research should evaluate the temporal reliability of the EAI-3 to ensure consistency over time.

Thirdly, the present study did not examine the impact of age, prior exercise experience, or the impact of other sample characteristics (such as type of practiced sport or main reason for exercising) on measurement invariance. Although some of these characteristics were used in preliminary linear models that led to interesting results, the difference in category frequencies prevented the use of such variables in measurement invariance models. Future studies could provide greater insight regarding measurement invariance

by considering these characteristics. A future study could address the limitations above and examine the utility of the EAI-3 to better understand its properties and its relationship to eating disorders, including primary and secondary exercise addiction. Finally, further research could explore what kind of information can be obtained from using the EAI-3 by integrating a clinical qualitative approach into the research process.

In conclusion, the psychometric properties of the Turkish version of the EAI-3 suggest that (and in line with previous results in other countries) this instrument is a reliable and valid tool for identifying individuals at risk of exercise addiction and distinguishing them from highly engaged but non-addicted exercisers.

Author contributions

Conception: U.G., A.S.; Design: U.G., A.S.; Data acquisition: U.G., E.T., A.S.; Data analysis: U.G., E.T., A.S.; Data interpretation: Z.G.Ö., M.D.N., M.D.G., M.A.; Drafting of the manuscript: Z.G.Ö., M.D.N., U.G., M.D.G., A.S.; Critical revision of the manuscript: Z.G.Ö., M.D.G., M.A., E.T., A.S. All authors reviewed the results, approved the final version of the manuscript, and agreed to be accountable for all aspects of this study.

Ethical approval

This study was approved by the Research Ethics Board of the University of Padova (Date: December, 12, 2021, Decision/Protocol No: 18F7D86802A124B1E783A3074ED80641). Informed consent was obtained from all participants involved in this study.

Data availability statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

Conflict of interest

The authors declare that this study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Generative AI statement

The authors declare that no generative AI or AI-assisted technologies were used in the writing or preparation of this study.

References

- Abramowitz, J. S., & Deacon, B. J. (2006). Psychometric properties and construct validity of the obsessive-compulsive inventory--revised: Replication and extension with a clinical sample. *Journal of Anxiety Disorders*, 20(8), 1016-1035. [Crossref]
- Adams, J., & Kirkby, R. (2001). Exercise dependence and overtraining: The physiological and psychological consequences of excessive exercise. *Sports Medicine, Training and Rehabilitation*, 10(3), 199-222. [Crossref]
- American Psychiatric Association. (2022). *Diagnostic and statistical manual of mental disorders* (5th ed.). American Psychiatric Publishing. [Crossref]
- Atak, H. (2013). The Turkish adaptation of the ten-item personality inventory. *Noro Psikiyatri Arsivi*, 50(4), 312-319. [Crossref]
- Aydemir, Ö., Köksal, B., Yalın-Sapmaz, Ş., & Yüceyar, H. (2015). Kadın üniversite öğrencilerinde REZZY yeme bozuklukları ölçeği Türkçe formunun güvenilirlik ve geçerliliği. *Anadolu Psikiyatri Dergisi*, 16, 31-35. [Crossref]
- Aydın, D., Baltacı, U. B., Erzen, E., Szabo, A., & Griffiths, M. D. (2023). The Turkish version of the exercise addiction inventory: Validity and reliability. *ADDICTA: The Turkish Journal on Addictions*, 10(2), 184-193. [Crossref]
- Beaton, D. E., Bombardier, C., Guillemin, F., & Ferraz, M. B. (2000). Guidelines for the process of cross-cultural adaptation of self-report measures. *Spine*, 25(24), 3186-3191. [Crossref]
- Colledge, F., Sattler, I., Schilling, H., Gerber, M., Pühse, U., & Walter, M. (2020). Mental disorders in individuals at risk for exercise addiction - a systematic review. *Addictive Behaviors Reports*, 12, 100314. [Crossref]
- Cook, B., Hausenblas, H., Crosby, R. D., Cao, L., & Wonderlich, S. A. (2015). Exercise dependence as a mediator of the exercise and eating disorders relationship: A pilot study. *Eating Behaviors*, 16, 9-12. [Crossref]
- Costa, S., & Oliva, P. (2012). Examining relationship between personality characteristics and exercise dependence. *Review of Psychology*, 19(1), 5-11. <https://hrcak.srce.hr/91383>.
- Daşkapan, A., & Atalay, K. D. (2013). Perceived exercise benefits and barriers among Turkish women: A pilot study. *Fizyoterapi Rehabilitasyon*, 24(1), 127-134.
- Freimuth, M., Moniz, S., & Kim, S. R. (2011). Clarifying exercise addiction: Differential diagnosis, co-occurring disorders, and phases of addiction. *International Journal of Environmental Research and Public Health*, 8(10), 4069-4081. [Crossref]
- Gauld, C., Francou, C., Millet, G. Y., Kern, L., & Gergelé, L. (2023). A symptom network analysis of exercise addiction and personality on ultra-marathon runners with serious complications. *International Journal of Sport and Exercise Psychology*, 22(7), 1625-1639. [Crossref]
- Gosling, S. D., Rentfrow, P. J., & Swann, W. B., Jr. (2003). A very brief measure of the big-five personality domains. *Journal of Research in Personality*, 37(6), 504-528. [Crossref]
- Granzio, U., Griffiths, M. D., Zou, L., Yang, P., Herschel, H. K., Junker, A., Akimoto, T., Stoll, O., Alpay, M., Aydın, Z., Zandonai, T., Di Lodovico, L., Lichtenstein, M. B., Trott, M., Portman, R. M., Schipfer, M., Cook, B., Cerea, S., Egorov, A. Y., ... Szabo, A. (2023). The expanded exercise addiction inventory (EAI-3): Towards reliable and international screening of exercise-related dysfunction. *International Journal of Mental Health and Addiction*, 22(6), 3559-3585. [Crossref]
- Granzio, U., Rabe, M., Gallucci, M., Spoto, A., & Vidotto, G. (2025). Not another post hoc paper: A new look at contrast analysis and planned comparisons. *Advances in Methods and Practices in Psychological Science*, 8(1). [Crossref]
- Gulker, M. G., Laskis, T. A., & Kuba, S. A. (2001). Do excessive exercisers have a higher rate of obsessive compulsive symptomatology? *Psychology, Health and Medicine*, 6(4), 387-398. [Crossref]
- Hausenblas, H. A., & Downs, D. S. (2002). How much is too much? The development and validation of the exercise dependence scale. *Psychology and Health*, 17(4), 387-404. [Crossref]
- Högström, G. M., Pietilä, T., Nordström, P., & Nordström, A. (2012). Body composition and performance: Influence of sport and gender among adolescents. *Journal of Strength and Conditioning Research*, 26(7), 1799-1804. [Crossref]
- Huang, Q. I. N., Huang, J., Chen, Y., Lin, D., Xu, S., Wei, J., Qi, C., & Xu, X. (2019). Overactivation of the reward system and deficient inhibition in exercise addiction. *Medicine and Science in Sports and Exercise*, 51(9), 1918-1927. [Crossref]
- Lichtenstein, M. B., Hinze, C. J., Emborg, B., Thomsen, F., & Hemmingsen, S. D. (2017). Compulsive exercise: Links, risks and challenges faced. *Psychology Research and Behavior Management*, 10, 85-95. [Crossref]
- Meyer, M., Sattler, I., Schilling, H., Lang, U. E., Schmidt, A., Colledge, F., & Walter, M. (2021). Mental disorders in individuals with exercise addiction-A cross-sectional study. *Frontiers in Psychiatry*, 12, 751550. [Crossref]
- Mónok, K., Berczik, K., Urbán, R., Szabo, A., Griffiths, M. D., Farkas, J., Magi, A., Eisinger, A., Kurimay, T., Kökönyei, G., Kun, B., Paksi, B., & Demetrovics, Z. (2012). Psychometric properties and concurrent validity of two exercise addiction measures: A population wide study. *Psychology of Sport and Exercise*, 13(6), 739-746. [Crossref]
- Morgan, J. F., Reid, F., & Lacey, J. H. (1999). The SCOFF questionnaire: Assessment of a new screening tool for eating disorders. *BMJ*, 319(7223), 1467-1468. [Crossref]
- Remilly, M., Mauvieux, B., & Drigny, J. (2023). Personality traits associated with the risk of exercise dependence in ultraendurance athletes: A cross-sectional study. *International Journal of Environmental Research and Public Health*, 20(2), 1042. [Crossref]
- Sakallı, N., & Kuzlak, A. (2018). How are women and men perceived? Structure of gender stereotypes in contemporary Turkey. *Nesne Psikoloji Dergisi*, 309-336. <https://hdl.handle.net/11511/37903>.
- Shroff, H., Reba, L., Thornton, L. M., Tozzi, F., Klump, K. L., Berrettini, W. H., Brandt, H., Crawford, S., Crow, S., Fichter, M. M., Goldman, D., Halmi, K. A., Johnson, C., Kaplan, A. S., Keel, P., LaVia, M., Mitchell, J., Rotondo, A., Strober, M., ... Bulik, C. M. (2006). Features associated with excessive exercise in women with eating disorders. *International Journal of Eating Disorders*, 39(6), 454-461. [Crossref]
- Starcevic, V. (2016). Behavioural addictions: A challenge for psychopathology and psychiatric nosology. *Australian and New Zealand Journal of Psychiatry*, 50(8), 721-725. [Crossref]
- Szabo, A. (2018). Addiction, passion, or confusion? New theoretical insights on exercise addiction research from the case study of a female body builder. *Europe's Journal of Psychology*, 14(2), 296-316. [Crossref]
- Szabo, A., & Demetrovics, Z. (2022). *Passion and addiction in sports and exercise*. Routledge. [Crossref]
- Szabo, A., & Kovacsik, R. (2019). When passion appears, exercise addiction disappears. *Swiss Journal of Psychology*, 78(3-4), 137-142. [Crossref]

- Terry, A., Szabo, A., & Griffiths, M. (2004). The Exercise Addiction Inventory: A new brief screening tool. *Addiction Research and Theory*, 12(5), 489-499. [\[Crossref\]](#)
- Trott, M., Jackson, S. E., Firth, J., Jacob, L., Grabovac, I., Mistry, A., Stubbs, B., & Smith, L. (2021). A comparative meta-analysis of the prevalence of exercise addiction in adults with and without indicated eating disorders. *Eating and Weight Disorders: EWD*, 26(1), 37-46. [\[Crossref\]](#)
- Weinstein, A. M., & Szabo, A. (2023). Exercise addiction: A narrative overview of research issues. *Dialogues in Clinical Neuroscience*, 25(1), 1-13. [\[Crossref\]](#)
- World Health Organization. (2020). *WHO guidelines on physical activity and sedentary behaviour*. <https://apps.who.int/iris/bitstream/handle/10665/336656/9789240015128-eng.pdf?sequence=1&isAllowed=y>
- Yeltepe, H., & İkizler, H. (2007). Egzersiz Bağımlılığı Ölçeği-21'in Türkçe geçerlilik ve güvenirlik çalışması. *Bağımlılık Dergisi*, 8(1), 29-35.
- Yorulmaz, O., Inozu, M., Clark, D. A., & Radomsky, A. S. (2015). Psychometric properties of the obsessive-compulsive Inventory-Revised in a Turkish analogue sample. *Psychological Reports*, 117(3), 781-793. [\[Crossref\]](#)
- Zeulner, B., Ziemainz, H., Beyer, C., Hammon, M., & Janka, R. (2016). Disordered eating and exercise dependence in endurance athletes. *Advances in Physical Education*, 6(2), 76-87. [\[Crossref\]](#)



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