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Analyzing the impact of COVID-19 anxiety on pornography addiction among high school students: The mediating role of self-regulation

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Abstract

Introduction: Pornography addiction is a rising concern among adolescents. This study explored how COVID-19 anxiety affects pornography addiction through self-regulation.

Materials and Methods: This descriptive-correlational study was conducted among all high school students in Tehran-Iran during the 2024-2025 academic year. Participants were selected through a multistage cluster sampling method. Based on Cochran's formula, a sample size of 550 students was estimated, and finally, 532 valid questionnaires were analyzed. Data were collected using the COVID-19 Anxiety Scale, the Self-Regulation Questionnaire, and the Problematic Pornography Use Scale. The data were analyzed through Structural Equation Modeling (SEM) using LISREL version 8.80.

Results: Path analysis results revealed that COVID-19 anxiety had a positive and significant direct effect on pornography addiction (β= 0.54, t= 21.38, *P*< 0.001). Moreover, COVID-19 anxiety indirectly influenced pornography addiction through a reduction in self-regulation (β= 0.27, t= 4.92, *P*< 0.01). There was also a significant negative relationship between self-regulation and pornography addiction (β= –0.33, t= –8.47, *P*< 0.001), indicating that higher self-regulation was associated with lower tendencies toward excessive pornography consumption.

Conclusion: The findings indicate that COVID-19 anxiety is a crucial factor in increasing adolescents' addictive behaviors, while enhancing self-regulation can mitigate this effect. Therefore, educational and counseling programs aimed at reducing anxiety and improving self-control are recommended for school settings.

Keywords: Adolescents, COVID-19 anxiety, Pornography addiction, Self-regulation

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Introduction

In recent years, advances in communication technologies and increased access to the Internet have led to substantial changes in adolescents' behavioral patterns and lifestyles (1). Online environments and social media platforms have become integral to their daily lives (2). While offering educational and social benefits, these digital spaces have also facilitated the emergence of risky and maladaptive behaviors (3,4). One notable behavioral challenge arising from this digital expansion is the repeated and uncontrolled use of pornographic content, which may develop into a form of behavioral addiction (5). Contrary to common misconceptions, Internet pornography addiction is not merely a deviant behavior but rather a compulsive and repetitive consumption pattern associated with an inability to control impulses, psychological distress, and impairment in academic, familial, and social functioning (6). This phenomenon is particularly concerning during adolescence — a sensitive stage for identity formation, emotional regulation, and moral development — where it can have lasting negative impacts on mental health and social adjustment (7).

With the onset of the global COVID-19 crisis, adolescents' psychological and social conditions were profoundly affected (8). Prolonged quarantines, school closures, limited social interactions, and increased screen time created a fertile ground for heightened COVID-19 anxiety and its behavioral consequences (9). COVID-related anxiety, characterized by excessive worry about infection, fear of death or loss of loved ones, and uncertainty about the future, may drive adolescents toward maladaptive coping mechanisms such as excessive Internet use and viewing of sexual content (10-21). Hence, COVID-19 anxiety can be regarded as an important antecedent contributing to the intensification of addictive behaviors, especially among adolescents with weak emotional regulation and self-control skills (3).

Within this context, the concept of self-regulation — a core construct in developmental psychology — plays a vital protective role in preventing maladaptive behaviors. Self-regulation refers to the ability to plan, manage emotions, and adjust behavior in pursuit of long-term goals (22). Studies have shown that adolescents with stronger self-regulatory capacities tend to display healthier and more adaptive responses when facing stress and anxiety (23-27). Conversely, deficits in self-regulation may lead individuals to engage in risky coping strategies such as excessive pornography use to temporarily alleviate distress (28-32).

Despite growing research on anxiety and behavioral addictions during the COVID-19 pandemic, a notable research gap remains concerning the relationship between COVID-19 anxiety and pornography addiction, particularly emphasizing the mediating role of self-regulation (33). Most previous studies have examined either the direct relationship between anxiety and general addictive behaviors (such as online gaming or social media use) or have focused on non-clinical and adult populations (34). However, exploring this association among high school adolescents — a group highly vulnerable to psychological and social risks — can provide new insights into the psychological mechanisms underlying this phenomenon.

From a scientific perspective, the present study seeks to develop an explanatory model of the relationships among COVID-19 anxiety, self-regulation, and pornography addiction to address the theoretical gap regarding the mediating function of regulatory processes in adolescent addictive behaviors. From a practical standpoint, the findings can guide the design of educational, counseling, and preventive programs in schools and adolescent mental health centers. Identifying the direct and indirect pathways through which anxiety influences addictive behavior will assist educators, policymakers, and clinicians in developing targeted interventions aimed at strengthening self-regulatory skills, reducing anxiety, and promoting adolescent mental health. Accordingly, this study aimed to examine the impact of COVID-19 anxiety on pornography addiction with the mediating role of self-regulation among high school students in Tehran. The study endeavors to deepen understanding of the psychological mechanisms underpinning adolescent addictive behaviors and to propose effective prevention and intervention strategies for future public health crises.

Materials and Methods

This applied study employed a descriptive-correlational design. The main objective was to examine the relationship between COVID-19

anxiety and pornography addiction, considering the mediating role of self-regulation among high school students in Tehran. Structural Equation Modeling (SEM) was used to analyze the relationships between the study variables.

The statistical population consisted of all senior high school students in Tehran during the 2023-2024 academic year. Using Cochran's formula for infinite populations (at a 95% confidence level and an allowable error of 0.048), the sample size was estimated at 550 participants. After excluding incomplete questionnaires, 532 valid responses were included in the final analysis (response rate: 96.6%) (35).

A multistage cluster sampling method was employed. First, four districts (3, 9, 15, and 21) were randomly selected from 22 districts of Tehran. In the second stage, one neighborhood from each district and one high school from each neighborhood were randomly chosen. In the third stage, two classes from each school were selected, and all students in those classes participated in the study. To ensure ethical compliance, permission was obtained from school principals, and informed consent was acquired from both students and their parents through phone communication. Questionnaires were distributed online via email, WhatsApp, and other social media platforms. For participants without internet access, the researcher assisted them in completing the electronic questionnaire using a tablet.

Research instruments

A) The Corona Disease Anxiety Scale (CDAS): This scale was developed and validated by Alipour et al. (2020) was used. This 18-item questionnaire includes two main subscales: psychological symptoms (items 1-9) and physical symptoms (items 10-18), rated on a four-point Likert scale ranging from never to always. The total score ranges from 0 to 54, with higher scores indicating greater anxiety related to COVID-19.

In the original validation study, Cronbach's alpha coefficients were reported as 0.879 for the psychological subscale, 0.861 for the physical subscale, and 0.919 for the total scale. Confirmatory factor analysis also indicated satisfactory fit indices (RMSEA= 0.086, CFI= 1, GFI= 0.99, AGFI= 0.98), confirming the strong psychometric properties of this tool for use among Iranian adolescents (36).

B) The Problematic Pornography Use Scale (PPUS): It was developed by Kor et al. (2014). This 12-item questionnaire is scored on a six-point Likert scale ranging from never (0) to always (5) and evaluates four dimensions: (1) psychological and social problems resulting from pornography use, (2) excessive and uncontrollable craving, (3) inability to control consumption behavior, and (4) use for escape or avoidance of negative emotions. Previous studies have confirmed the construct validity of the PPUS, with Cronbach's alpha coefficients of 0.91, 0.86, 0.75, and 0.93 across the four dimensions, respectively, indicating high reliability and internal consistency. In the present study, the PPUS served as the primary instrument for assessing the extent of problematic pornography use among students (37).

C) The Self-Regulation Questionnaire (SRQ): Francis (1999) developed and it consists of 30 items distributed across six dimensions: memory strategy (items 1-5), goal setting (items 6-8), self-evaluation (items 9-14), help-seeking (items 15-20), responsibility (items 21-24), and organization (items 25-30). Each item is rated on a five-point Likert scale ranging from completely disagree (1) to completely agree (5), where higher scores indicate stronger self-regulatory ability.

The total self-regulation score, obtained by summing all items, reflects the individual's overall capacity for self-regulation. The instrument has demonstrated strong validity and reliability in both Iranian and international studies, with Cronbach's alpha coefficients of 0.83 and 0.81, confirming its robustness for measuring self-regulation (38).

After data collection, the dataset was carefully reviewed and cleaned to ensure accuracy and reliability. Data analysis was conducted at both descriptive and inferential levels. At the descriptive level, indicators such as mean, standard deviation, and frequency were used to describe the demographic characteristics of the participants.

At the inferential level, Pearson's correlation coefficient and path analysis were employed to test the research hypotheses and assess the fit of the conceptual model using LISREL version 8.80. All statistical analyses were performed after confirming the assumptions of data normality, multicollinearity, and independence of errors. The significance level for all tests was set at $P< 0.05$.

Results

According to the demographic data of the present study, out of 532 participants, 307 (57.7%) were male and 225 (42.3%) were female. Regarding housing status, 335 students (63%) lived in their own homes, while 197 (37%) lived in rented accommodations. In terms of parental employment, 472 fathers (88.7%) were employed and 60 (11.3%) were unemployed; additionally, 417 mothers (78.4%) were homemakers and 115 (21.6%) were employed.

The results also indicated that 411 families (77.3%) had a monthly income below 60 million Rials, while 121 families (22.7%) earned more than that amount. Concerning parents' educational levels, 166 mothers (31.2%) had less than a high school diploma, 184 (34.6%) held a high school diploma, and 182 (34.2%) had education beyond the diploma level. Similarly, among fathers, 143 (26.9%) had less than a high school diploma, 190 (35.7%) had a diploma, and 199 (37.4%) had higher education. These results suggest that the majority of participating families belonged to a middle socioeconomic and educational class. According to Table 1, the mean score for psychological symptoms was 13.10, physical symptoms 13.13, corona anxiety 26.23, psychosocial pornography problems 3.08, uncontrollable use tendency 3.04, behavior control inability 3.02, avoidance-motivated use 3.00, pornography addiction 12.14, memory strategy 14.97, goal setting 9.17, self-evaluation 18.02, help-seeking 18.11, responsibility 12.04, organization 18.05, and self-regulation 90.37. All variables were calculated based on data from 532 participants, and no missing values were reported. The obtained skewness and kurtosis values indicate that the data distribution for all variables is approximately normal. All goodness-of-fit indicators were within acceptable or excellent ranges, confirming that the proposed structural model had a strong fit to the empirical data (Table 2).

Table 1. Descriptive statistics of the study variables

Variable	Mean	Mode	SD	Skewness	Kurtosis
Psychological symptoms	13.10	18	7.809	-0.009	-0.465
Physical symptoms	13.13	18	7.825	-0.023	-0.478
Corona anxiety	26.23	36	15.301	-0.019	-0.277
Psychosocial pornography problems	3.08	3	2.060	-0.056	-1.066
Uncontrollable use tendency	3.04	3	2.089	-0.031	-1.103
Behavior control inability	3.02	3	2.070	-0.038	-1.080
Avoidance-motivated use	3.00	3	2.068	-0.022	-1.100
Pornography addiction	12.14	12	7.587	-0.041	-0.603
Memory strategy	14.97	15	5.744	-0.041	-0.642
Goal setting	9.17	9	3.572	-0.130	-0.807
Self-evaluation	18.02	18	6.728	-0.041	-0.468
Help-seeking	18.11	18	6.746	-0.097	-0.477
Responsibility	12.04	12	4.622	-0.083	-0.681
Organization	18.05	18	6.773	-0.046	-0.533
Self-regulation	90.37	90	32.170	-0.068	-0.065

Table 2. Fit indices for the final model

Variable/Index	χ^2/df	RMSEA	GFI	RMR	CFI	NFI	NNFI
Final model	1.06	0.011	1.00	0.025	1.00	1.00	1.01
Acceptable levels (10)	χ^2/df< 5	RMSEA< 0.08	GFI> 0.90	RMR< 0.05	CFI> 0.90	NFI> 0.90	NNFI> 0.90

In assessing the direct associations among the variables, the significance of the estimated coefficients was determined based on t-values greater than 1.96 or less than -1.96, which indicate statistically meaningful relationships. The results revealed that COVID-19 anxiety exerted a significant positive direct influence on pornography addiction (standardized coefficient= 0.54, t= 213.85). This suggests that higher levels of anxiety related to the pandemic correspond to greater tendencies toward pornography use, implying that emotional distress and uncertainty during the COVID-19 period may have intensified individuals'

reliance on maladaptive coping behaviors such as addictive online consumption (Table 3 and Figures 1 and 2). Conversely, self-regulation demonstrated a significant negative direct relationship with pornography addiction (standardized coefficient= -0.30, t= -236.59) (39). This indicates that individuals with stronger self-regulation abilities are less likely to develop or sustain addictive behaviors related to pornography use, as they possess greater capacity to manage impulses and emotional triggers. The overall explained variance (R^2= 0.19) shows that about 19% of the variation in pornography addiction is accounted for by the joint effects of COVID-19 anxiety and self-regulation, highlighting the psychological importance of emotional control mechanisms in mitigating addictive tendencies during stressful circumstances (Table 3 and Figures 1 and 2). The results of the indirect path analysis revealed that COVID-19 anxiety indirectly increased pornography addiction by weakening individuals' self-regulation abilities. Specifically, higher levels of anxiety had a significant negative effect on self-regulation (standardized coefficient= -0.40, t= -1981.87), indicating that elevated anxiety reduces individuals' capacity to control their impulses, emotions, and behaviors. This reduction in self-regulation, in turn, negatively affects the ability to manage addictive behaviors, leading to greater tendencies toward pornography use.

The calculated indirect effect coefficient (β= 0.12) suggests that COVID-19 anxiety indirectly heightens pornography addiction by undermining internal regulation and behavioral control mechanisms. Therefore, it can be concluded that self-regulation plays a significant mediating role in the relationship between COVID-19 anxiety and pornography addiction (Table 3 and Figures 1 and 2) (40).

Table 3. Standardized coefficients and significance levels of the final model

Dependent variable	Independent variable	Standardized coefficient	t-value	Result
Pornography addiction (Y)	COVID-19 anxiety (X)	0.54	213.85	Significant (+)
Pornography addiction (Y)	Self-regulation (XY)	-0.30	-236.59	Significant (-)
Self-regulation (XY)	COVID-19 anxiety (X)	-0.40	-1981.87	Significant (-)

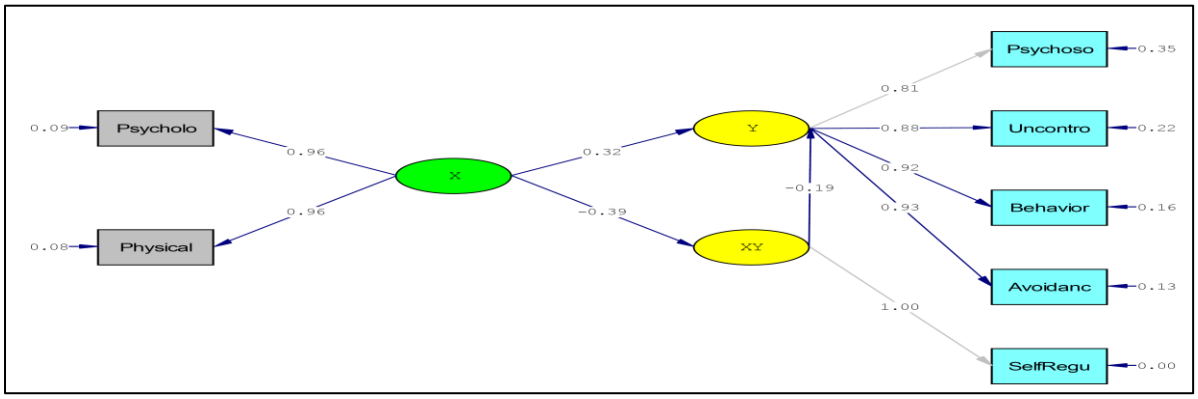


Figure 1. Structural equation modeling with standardized estimation

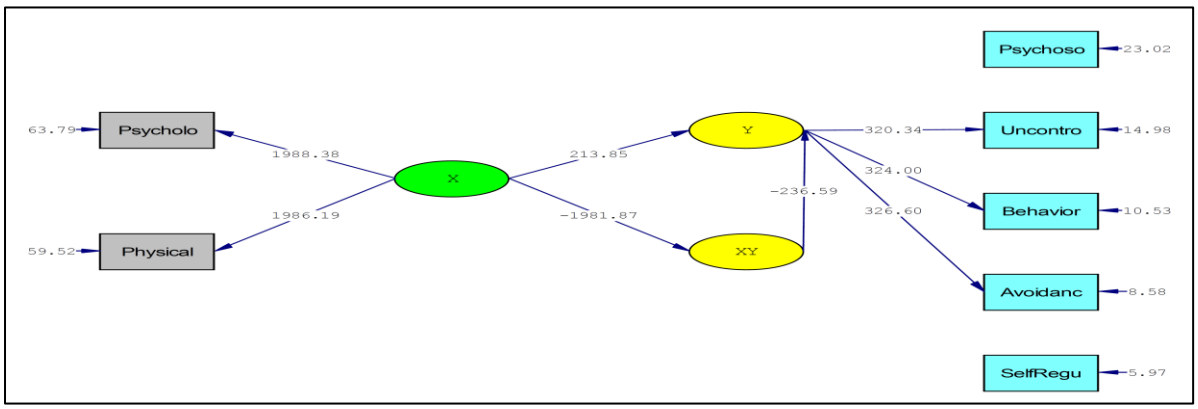


Figure 2. Structural equation modeling in terms of significance

Discussion

The results of the study indicated that anxiety caused by the COVID-19 pandemic directly increased adolescents' tendency to consume pornographic content. This finding is consistent with numerous studies that have identified heightened anxiety, social isolation, and greater internet accessibility as key factors influencing online sexual behaviors during the pandemic (11-13,21). In particular, research conducted in Europe and the United States revealed that during periods of lockdown, the frequency of pornography searches and visits to related websites increased significantly (15,18,19). However, several longitudinal studies conducted among adult or nationally representative populations have reported divergent results, suggesting that the increase in pornography use might have been temporary or limited to certain age or cultural subgroups (14). Such discrepancies can be attributed to differences in sample populations (adolescents in Tehran versus Western adults), measurement tools (self-report questionnaires versus behavioral data), and research design (cross-sectional versus longitudinal). Theoretically, this finding can be explained by the fact that anxiety activates negative emotional systems, leading individuals to seek immediate means of tension reduction. Pornographic consumption thus functions as an avoidant and unstable emotional regulation strategy among adolescents; hence, elevated anxiety levels may psychologically reinforce such behaviors.

According to the findings, there was a significant negative relationship between self-regulation and pornography addiction. In other words, the higher the level of self-regulation among adolescents, the lower their likelihood of developing addictive tendencies toward sexual content consumption. This result aligns with previous research identifying poor impulse control and difficulties in emotion regulation as major predictors of online addictive behaviors (23,28-30). Numerous studies across different countries have shown that individuals with stronger self-monitoring and emotional regulation skills are better able to control their behavior when faced with stress or immediate stimuli (24,32). Conversely, some studies have found that the protective effect of self-regulation diminishes when moderating factors such as family support or media literacy are considered (23,26). These differences may stem from variations in measurement instruments, cultural contexts, or the age range of participants. The scientific interpretation of this relationship suggests that self-regulation, as a cognitive-emotional construct, enhances one's ability to manage short-term impulses in pursuit of long-term goals, thereby reducing impulsive behaviors such as excessive sexual content consumption.

Path analysis results revealed that COVID-19–related anxiety indirectly increased pornography addiction through reduced self-regulation. This mediating effect aligns with theoretical frameworks and empirical evidence indicating that severe anxiety undermines executive brain functions, including attentional control and impulse inhibition, thereby facilitating impulsive behaviors (16,20,25-27,28-30). Experimental and systematic review studies have also confirmed that heightened anxiety is associated with decreased self-control capacity and can lead to excessive use of virtual environments and risky online content (25,27,30). Nevertheless, some studies failed to confirm the mediating role of self-regulation directly, likely due to the methodological limitations of cross-sectional designs and their inability to establish causality (14,15,18). Thus, variations in findings are largely attributable to methodological constraints and measurement differences. Scientifically, intense anxiety leads to cognitive overload, reduced concentration, and weakened inhibition of emotional responses, thereby disrupting cognitive control and increasing the tendency toward immediate tension-relieving behaviors such as consuming sexual content.

Overall, the findings suggest that strengthening self-regulation and emotion regulation skills can play both preventive and therapeutic roles in reducing risky online behaviors, including excessive pornography use. This conclusion is consistent with international reviews indicating that cognitive-emotional and impulse control training can help mitigate problematic virtual behaviors (11,12,18,19,28-30). Clinical studies have also supported the effectiveness of cognitive-behavioral interventions and mindfulness practices in reducing online addictive behaviors (29,30). However, some inconsistencies observed across studies are likely due to cultural differences, intervention types, duration, and evaluation methods (13-15). Particularly in more traditional societies, cultural sensitivity and normative factors can

influence the effectiveness of educational interventions related to sexual behavior. The theoretical explanation of this finding is that enhancing emotional regulation and self-awareness activates higher-order cognitive pathways in the brain, improves control over emotional responses, and thereby reduces the inclination toward avoidant behaviors such as pornography consumption.

Consequently, self-regulation-based training can be effectively incorporated into adolescent prevention programs. However, several limitations should be acknowledged, including the sample's restriction to Tehran, the correlational nature of the design, and reliance on self-report questionnaires, which may limit generalizability and precision. Moreover, unexamined variables such as family culture and access to health information could also influence outcomes.

Future research should employ experimental or longitudinal designs across different regions of Iran to clarify causal and contextual mechanisms.Based on the findings, it is recommended that educational programs focusing on strengthening self-regulatory, emotional control, and responsibility skills be implemented for adolescents. These programs, combined with psychological counseling to reduce crisis-related anxiety (such as during pandemics), can play a preventive role against addictive behaviors like pornography consumption. Enhancing self-regulation should be recognized as an essential mediating mechanism for reducing maladaptive behaviors among youth.

Conclusion

The results of this study demonstrated that anxiety associated with the COVID-19 pandemic directly and indirectly—through diminished self-regulation—contributed to an increased tendency toward behavioral addiction in the form of pornography use among students. In other words, heightened anxiety reduces individuals' capacities to regulate emotions, impulses, and behaviors, thereby fostering maladaptive and dependency-related patterns. Conversely, self-regulation acts as a significant protective and mediating factor in mitigating these effects. These findings highlight that strengthening self-regulatory, emotional control, and resilience skills can serve as an effective preventive approach to reducing addictive behaviors and promoting adolescent mental health.

Accordingly, the development of educational and psychological interventions centered on anxiety management and self-regulation improvement in school settings can play a crucial role in mitigating behavioral harms associated with social stressors and future crises.

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Conflict of Interest

The authors declare that there is no conflict of interest.

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No financial support was received from any institution for the conduct of this research.

Ethical Considerations

All ethical principles were observed in this study. Participants were informed about the research objectives and procedures, participation was voluntary, and confidentiality of their responses was guaranteed. The study protocol was approved by the Ethics Committee of Kerman University of Medical Sciences

Code of Ethics

IR.KMU.REC.1401.178

Authors' Contributions

Conceptualization and study design: Shahrzad Sanjari, Mohammad Reza Mohammadi Soleimani

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Data analysis and interpretation: Hamidreza Abbasi, Mohammad Reza Jahan

Manuscript drafting and editing: Abdolhakim Khozai Feyzabad and Mohammad Reza Mohammadi Soleimani

Final approval of the manuscript: All authors reviewed and approved the final version of the manuscript.

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