Neuropsychological Effects Resulting from the Consumption of Pornographic Material

Efeitos Neuropsicológicos Decorrentes do Consumo de Material Pornográfico
Efectos Neuropsicológicos Derivados del Consumo de Material Pornográfico

RESUMO
Objetivo: Investigar os efeitos neuropsicológicos consequentes ao ato de consumo de material pornográfico. **Método:** Trata-se de uma revisão integrativa da literatura com síntese narrativa, realizada nas bases de dados Google Scholar e PubMed, com recorte temporal de 2018 a 2024. Foram selecionados e analisados 28 artigos qualitativos. **Resultado:** O consumo problemático associa-se a alterações no sistema de recompensa cerebral semelhantes à dependência química. Identificou-se redução de massa cinzenta no córtex pré-frontal, rigidez cognitiva, falhas na memória de trabalho e impulsividade. Observaram-se também aumento da agressividade, disfunções sexuais, desconexão emocional e isolamento social. **Conclusão:** A exposição excessiva a conteúdos pornográficos gera prejuízos neurobiológicos e psicossociais significativos, evidenciando a necessidade de novos estudos para padronização diagnóstica e desenvolvimento de intervenções clínicas eficazes.
DESCRITORES: Comportamento; Ajustamento Emocional; Processos Mentais; Função Executiva; Motivação.

ABSTRACT
Objective: To investigate the neuropsychological effects resulting from the act of consuming pornographic material. **Method:** This is an integrative literature review with narrative synthesis, carried out in the Google Scholar and PubMed databases, from 2018 to 2024. Twenty-eight qualitative articles were selected and analyzed. **Result:** Problematic consumption is associated with alterations in the brain reward system similar to chemical dependency. Reductions in gray matter in the prefrontal cortex, cognitive rigidity, working memory failures, and impulsivity were identified. Increased aggression, sexual dysfunctions, emotional disconnection, and social isolation were also observed. **Conclusion:** Excessive exposure to pornographic content generates significant neurobiological and psychosocial impairments, highlighting the need for further studies for diagnostic standardization and the development of effective clinical interventions.
DESCRIPTORS: Behavior; Emotional Adjustment; Mental Processes; Executive Function; Motivation.

RESUMEN
Objetivo: Investigar los efectos neuropsicológicos resultantes del acto de consumo de material pornográfico. **Método:** Se trata de una revisión integrativa de la literatura con síntesis narrativa, realizada en las bases de datos Google Scholar y PubMed, abarcando el período de 2018 a 2024. Se seleccionaron y analizaron 28 artículos cualitativos. **Resultado:** El consumo problemático se asocia con alteraciones en el sistema de recompensa cerebral similares a la dependencia química. Se identificó una reducción de la materia gris en la corteza prefrontal, rigidez cognitiva, fallos en la memoria de trabajo e impulsividad. También se observaron un aumento de la agresividad, disfunciones sexuales, desconexión emocional y aislamiento social. **Conclusión:** La exposición excesiva a contenidos pornográficos genera perjuicios neurobiológicos y psicosociales significativos, evidenciando la necesidad de nuevos estudios para la estandarización diagnóstica y el desarrollo de intervenciones clínicas eficaces.
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RECEIVED: 11/25/2025 **APPROVED:** 01/05/2026

How to cite this article: Costa LJR, Ferreira FHL, Alves CHL. Neuropsychological Effects Resulting from the Consumption of Pornographic Material. Saúde Coletiva (Brazilian Edition) [Internet]. 2026 [cited year month day];17(106):19750-19765. Available from: DOI: 10.36489/saudecoletiva.2026v17i106p19750-19765

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INTRODUCTION

According to the International Telecommunication Union [1], 67% of the world's population has access to the internet. As this is currently one of the main means of accessing pornography, in Brazil, 22 million people have admitted to consuming such content, with 58% of the audience consisting of young people under the age of 35 [2].

Despite such a significant number of users, pornography and its effects are still treated as a taboo in society. Some studies suggest that persistent consumption of Pornographic Material (PM) may be linked to physical and emotional problems, causing harm to cognitive development and social interactions. Such concerns must be considered relevant in a globalized, technological world with increasingly rapid access to this content.

Although we live in a connected country, the Brazilian scientific community has not yet accurately determined the effects of this exposure on mental health, interpersonal relationships, and individual well-being, as the consequences of PM use are poorly studied in Brazil [3]. Considering that pornography affects individuals differently based on gender and sexuality, research is needed on the motivations for consumption, as well as the related a posteriori factors [2].

Given this gap, the following guiding question arises: what are the neuropsychological effects resulting from the consumption of pornographic material? Therefore, the objective of this study is to conduct an integrative review with a narrative synthesis to investigate changes in the brain's reward system and cognitive functions, as well as their implications for human behavior.

METHOD

This is a qualitative, descriptive study and an integrative literature review with a narrative synthesis. Data collection took place from March 2024 to March 2025. The guiding question of the research process was: 'What are the neuropsychological impacts resulting from the use of pornography?'. Initially, the aim was to understand the effect of use and to delineate what the literature defined as 'use' and 'abuse'; however, after the first searches, the focus shifted predominantly to data related to problematic use and its effects.

The review did not follow a pre-established protocol in repositories. The research procedures followed standardized guidelines without a formal protocol. Google Scholar and PubMed databases were used as information sources. The search terms used (combinations of keywords and controlled descriptors) were: "reward system brain addiction pornography," "pornography addiction," "pornography addiction brain," "pornography brain effect," "pornography neuropsychological effects," "neurobiology of addiction," "neurobiology of reward," "neuropsychology of addiction," "problematic online pornography use," "brain neurochemistry of pornography," "problematic pornography use," "pornography." The Boolean operators 'AND' and 'OR' were used. A language filter was applied, including publications in English, Portuguese, and Spanish. The publication period criterion used was from 2018 to 2024.

As eligibility/exclusion criteria, the following were excluded: duplicate results, results that could not be read in full, and results lacking identifiers such as DOI, ISSN, or PMID. The study selection process began with a review of titles and abstracts to identify potentially eligible articles and, subsequently, through a full-text review of the selected studies; the aforementioned criteria were applied at both stages.

Data extraction and organization were conducted using the individual article indexing method. Subsequently, the extracted fragments (with their corresponding observations) were compiled into 12 thematic groups for analysis: History, Rationale, and Definitions; ICD and DSM; Reward System; Neurology; Cognition; Behavior; Motivation; Sensitization and Desensitization; Comorbidities; Risk Factors; Testing Tools; and Treatment. Meetings were held for organization, qualitative synthesis of the data, and discursive writing.

Regarding ethical aspects, the research was conducted exclusively using secondary data in the public domain. Thus, in accordance with Resolution No. 510/2016 of the Na-

DOI: 10.36489/saudecoletiva.2026v17i106p19750-19765

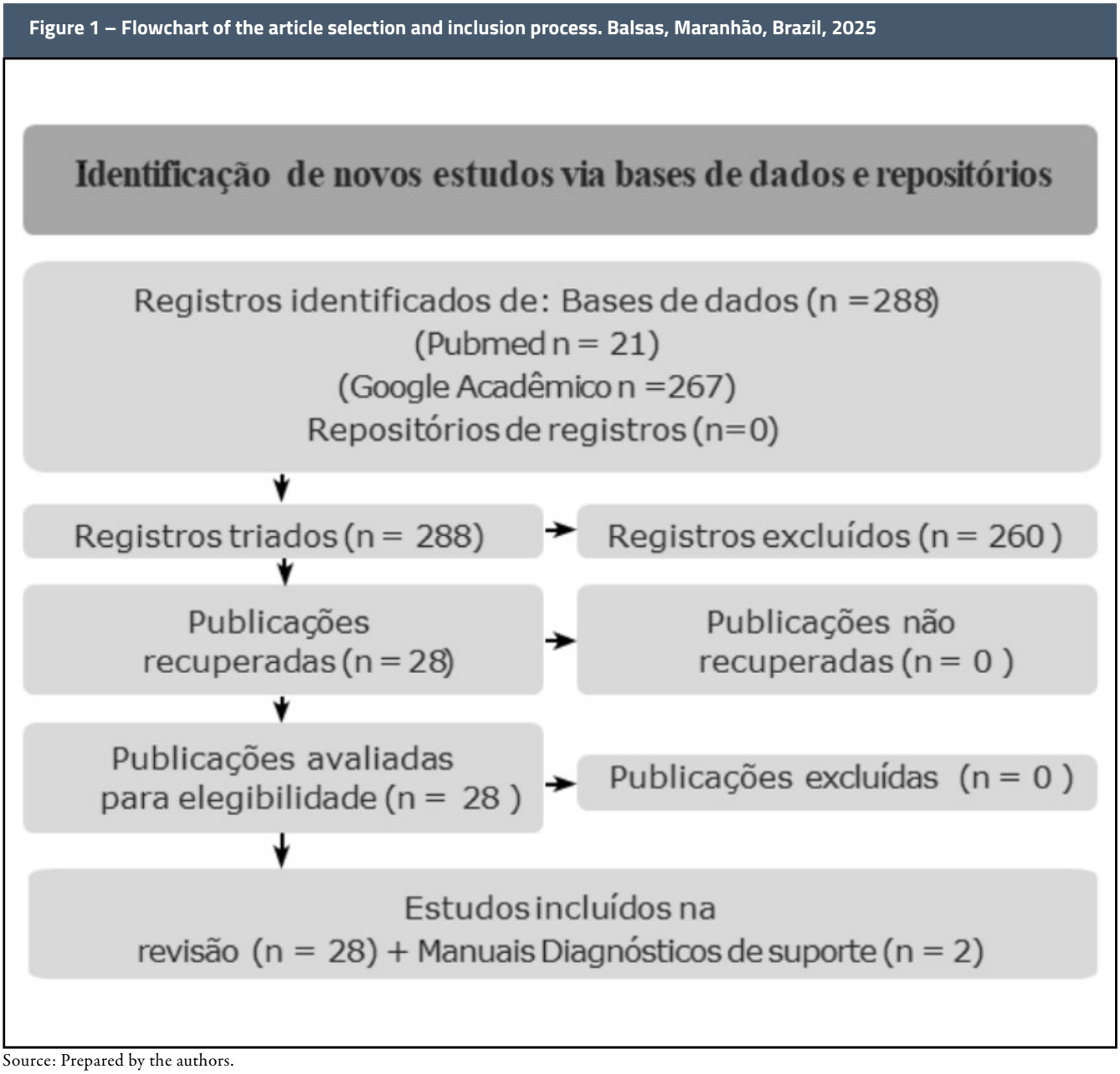
tional Health Council, the study is exempt from review by the Research Ethics Committee (CEP) and registration in the CEP/CONEP system.

Regarding methodological limitations, publication biases may be present, as there is a scarcity of studies that address and discuss more broadly the effects on various genders and sexualities beyond heterosexual men.

RESULTS

A total of 288 publications were found in the consulted databases. After reviewing the titles and abstracts and applying the eligibility criteria described in the methodology, 28 articles were selected. The detailed flowchart of the identification, screening, and inclusion of studies is illustrated in Figure 1.

Figure 1 – Flowchart of the article selection and inclusion process. Balsas, Maranhão, Brazil, 2025



Source: Prepared by the authors.

The details of the 28 selected studies that make up the sample for this review, as well as the methodological data, are presented in Table 1 below.

DOI: 10.36489/saudecoletiva.2026v17i106p19750-19765

Table 1 – Characteristics of the selected studies regarding title, authorship/year, objective, and methodology. Balsas, Maranhão, Brazil, 2025.

Título	Autoria/Ano	Objective	Methodology
Online Porn Addiction: What We Know and What We Don't—A Systematic Review	Alarcón, R et al. 2019	To synthesize existing knowledge on problematic online pornography use as a pathological condition.	Systematic review
Inhibitory control and problematic Internet pornography use – The important balancing role of the insula	Antons, S et al. 2020	To investigate associations between symptoms of problematic pornography use, desire, and neural activity in the impulsive, reflective, and interoceptive systems.	Quantitative experimental research
A influência do uso da pornografia virtual no desempenho sexual e na vinculação afetiva	Araújo et al. 2023	Investigate the influence of virtual pornography use on sexual performance and emotional bonding.	Narrative literature review
O impacto da pornografia online na saúde dos adolescentes	Assis, D. 2024	Explore the multiple impacts of online pornography consumption on adolescents, dividing the analysis into three main areas of impact: cerebral, psychological, and behavioral/social.	Narrative literature review
Uso compulsivo de pornografia e seus impactos negativos.	Baggio, A et al. 2023	Investigate the phenomenon of compulsive pornography use and analyze the negative impacts associated with this behavior.	Narrative literature review
Two sides of the same medal? Reward mechanisms between motivational drives and psychopathology	Balconi, M et al. 2022	Investigate the reward mechanisms underlying motivational drives, analyzing how BIS and BAS dynamics relate to the manifestation of psychopathological symptoms.	Narrative literature review
Atitudes de Jovens frente à Pornografia e suas Consequências	Baumel, C et al. 2019	Identify and understand the attitudes that men and women have toward pornography.	Qualitative research
Impactos neuropsicológicos decorrentes do uso de substâncias psicoativas	Bomfim, A et al. 2022	Investigate the impacts of psychoactive substance use on the judgment and decision-making process.	Narrative literature review
High-Frequency Pornography Use May Not Always Be Problematic	Bothe, B et al. 2020	Identify pornography use profiles based on frequency of use and problematic use through a person-centered analytical approach.	Quantitative research
The Assessment of Problematic Internet Pornography Use: A Comparison of Three Scales with Mixed Methods	Chen, L et al. 2020	Compare different screening tools for problematic Internet pornography use (IPU) and identify the most accurate measure.	Mixed-methods research (quantitative and qualitative)
A relação entre o uso do celular e a exposição precoce à pornografia: uma revisão integrativa de literatura	Cruz, C et al. 2024	Analyze the consequences of indiscriminate screen exposure in childhood, seeking to identify the relationship with pornography consumption and its main repercussions.	Integrative literature review
Dos efeitos à constatação dos usos da pornografia pela audiência.	Ferreira, R et al. 2023	Identify and discuss how pornography consumption impacts behaviors, interpersonal relationships, and the formation of values.	Narrative literature review
Aberrant orbitofrontal cortex reactivity to erotic cues in Compulsive Sexual Behavior Disorder.	Golec, K et al. 2021	Examine cue reactivity across multiple key structures in the brain's reward system.	Experimental research with a quantitative approach
Pornography use among adolescents and the role of primary care.	Jhe, G et al. 2023	Provide an objective overview of pornography use among adolescents and guidelines for screening.	Narrative literature review
Neurocognitive Mechanisms in Compulsive Sexual Behavior Disorder.	Kowalewska, E et al. 2018	Examine and discuss the neurocognitive mechanisms underlying the treatment of compulsive sexual behavior disorder (CSBD).	Systematic review
Neural and behavioral correlates of sexual stimuli anticipation point to addiction-like mechanisms...	Benny, L et al. 2022	Investigate the neural and behavioral correlates of the anticipation of sexual stimuli in individuals with compulsive sexual behavior disorder.	Experimental research with a quantitative approach
Neurobiology of the Cerebral Reward System.	Moraes, F. 2022	Discuss the main characteristics and peculiarities of the human SRC.	Narrative literature review

DOI: 10.36489/saudecoletiva.2026v17i106p19750-19765

Pornography's Effect on the Brain: A Review of Modifications in the Prefrontal Cortex.	Muller, k. 2018	Review the effects of pornography use on the brain, particularly changes in the prefrontal cortex.	Narrative literature review
Losses disguised as wins evoke the reward positivity event-related potential in a simulated machine gambling task.	Myles, D et al. 2024	Determine whether "losses disguised as gains" (LDWs) evoke the reward positivity component.	Experimental research with a quantitative approach
Physiological feelings.	Edward, F et al. 2019	Produce a series of comprehensive reviews summarizing current knowledge on affective neuroscience.	Narrative literature review
Pornography Consumption and Cognitive-Affective Distress.	Privara, M et al. 2023	Investigate the relationship between internet pornography consumption and cognitive-affective distress.	Empirical research with a quantitative approach
Relação entre a fadiga, dependência de dopamina com as disfunções neuronais.	Rodrigues, F. 2020	Analyze the relationship between fatigue, dopamine dependence, and neuronal dysfunctions.	Theoretical review
Hot and cold executive functions in the brain: A prefrontal-cingular network	Salehinejad, M et al. 2021	Review and integrate knowledge regarding the brain's executive functions ("hot" and "cold").	Theoretical review
Disfunção erétil em jovens causada por pornografia.	Silva, A.F.C et al. 2023	Investigate the association between pornography use and the rising rates of erectile dysfunction.	Narrative literature review
The assessment and treatment of adult heterosexual men with self-perceived problematic pornography use: A review.	Sniewski, L et al. 2018	Review and evaluate assessment and treatment methods targeting adult heterosexual men.	Systematic literature review
A Current Understanding of the Behavioral Neuroscience of Compulsive Sexual Behavior Disorder...	Stark, R et al. 2018	Summarize empirical findings regarding the neurobiological underpinnings of CSBD.	Literature review
Individual cortisol response to acute stress influences neural processing of sexual cues.	Stark, R et al. 2022	Investigate the effect of stress during the anticipation and viewing of sexually explicit material.	Empirical research with an experimental approach
No significant effect of frequent online sexual behaviour on Pavlovian-to-instrumental transfer (PIT)...	Wells, T et al. 2022	Test whether the motivational aspect of Pavlovian conditioned stimuli reinforced the instrumental response relative to monetary rewards.	Empirical research with an experimental approach

Source: Prepared by the authors

The evidence gathered indicates the existence of common neurobiological and environmental foundations between chemical and behavioral addiction disorders [4-5]. Although only "Internet Gaming Disorder" is formally recognized as an addiction [6], other behaviors have addictive potential, even without explicit categorization [5,7]. There is resistance to standardizing the term "addiction" for the consumption of pornographic material (PM) due to a lack of criteria [8-9]; however, differential or umbrella diagnoses, such as compulsive sexual behavior disorder or excessive internet use, are applicable [5-6,10-11].

The literature distinguishes between problematic use—characterized by impaired control, neglect, and persistence in use despite harm—and addiction, which adds criteria of tolerance and withdrawal [5,12–13]. Despite the scarcity of robust data on tolerance and withdrawal in isolation in problematic pornography use (PPU), the diagnostic criteria for compulsive sexual behavior disorder (CSBD) may be present [10–12,14]. Increased consumption is driven by internet accessibility and the "TRIPLE A" factor (accessibility, affordability, anonymity), which exacerbates the potential for dependence [5], making online pornography one of the most prevalent risk behaviors [13]. It should be noted that frequency of use, in and of itself, does not define the problem, as it depends

DOI: 10.36489/saudecoletiva.2026v17i106p19750-19765

on self-perception and individual characteristics [15].

The RCS is defined as a network that modulates behaviors for adaptability. MP consumption is associated with neurobiological changes in the RCS similar to those observed in substance addictions [8-9]. The brain begins to prioritize the addictive behavior at the expense of vital adaptive behaviors, via progressive excitation of dopaminergic pathways [16-18]. Dopamine plays a significant role in this system, influencing emotional, inhibitory, and motivational processes [19].

SRC structures, such as the nucleus accumbens, ventral tegmental area (VTA), and prefrontal cortex, integrate cognitive and emotional signals crucial for decision-making [8, 17, 20–22]. Dysfunction of the VTA can trigger severe behavioral consequences [8]. The functioning of the RCS is based on the acquisition of pleasure as a learning cue [17–18], shaping motivational values through the frequency and intensity of stimuli [23] and using anticipated rewards to direct motivation [21, 24].

The neuroplastic process is impacted by the MP through hyperactivation and excessive valuation of stimuli, generating repetitive seeking [8–9]. This feedback mechanism can lead to compulsion due to increased dopaminergic response [8–9,25], with valuation mediated by judgment and decision-making [26]. Concurrently, SRC hypoactivity occurs, resulting in desensitization and hyporesponsiveness to habitual stimuli or real partners [8–9,25].

Frequent consumption may lead to a decrease in gray matter and alterations in brain function, similar to chemical dependency [9, 13, 16], as well as negative associations with brain volume due to neuroplasticity [4]. The prefrontal cortex exhibits volumetric loss, impairing inhibitory control and judgment [16]. Sensory disturbances are observed in the preoptic area [27] and differences in neural reactivity in the lingual gyrus [24]. There is also a decrease in connectivity between the ventral striatum, amygdala, and prefrontal cortex [5].

In the cognitive domain, impairments are evident in executive functions, cognitive rigidity, and memory problems [5], as well as in learning [4, 25]. Affected individuals demonstrate disadvantageous decision-making and low cognitive flexibility [13], correlating with decreased self-control [5, 9, 16]. Attention undergoes changes such as increased biases [27], difficulty in shifting attention [5], and a propensity for rapid boredom [15]. The orientation of pleasure toward the virtual realm can lead to maladaptive learning and inhibition of responses to real-world experiences [9, 25, 27].

Moral issues influence problematic use, generating internal conflicts [28]. Exposure to PM is associated with increased aggression in adolescents [29], driven by a hyperactive impulsive system [11] and potential hypersexual behavior [27]. There is evidence of an association with early onset of sexual activity and risky behaviors [25]. Masturbation can become a compulsive act of tension relief rather than full sexual satisfaction [8].

Socially, users may exhibit emotional disturbances, stress, depression, and a greater propensity for substance abuse [9, 25, 27]. Changes in the SRC are linked to sexual dysfunctions such as erectile dysfunction and premature ejaculation [8-9, 27]. There is impairment in establishing personal relationships, marked by emotional detachment and anhedonia.

Common strategies involve reduction, alternation, and cessation of use [28]. Temporary abstinence ("reset") shows positive effects, although recovery is slower in young people due to neuroplasticity [8,16]. Cognitive-Behavioral Therapy (CBT) has been shown to be effective in managing compulsive behaviors [16], and may reduce depressive symptoms and improve quality of life, even without complete cessation of the behavior [5]. Approaches such as family therapy and Acceptance and Commitment Therapy (ACT) help manage shame and guilt [5,9]. A combination of psychological and pharmacological interventions is recommended [5, 9, 16]. Mindfulness-based psychotherapies may outperform purely pharmacological approaches [5]. Relaxation techniques are recommended for controlling cortisol and stress [30].

DISCUSSION

Analysis of the results suggests a significant convergence between the mechanisms of problematic pornography use (PPU) and psychoactive substance use, corroborating the hypothesis of a common neurobiological etiology. Dysfunction in the Brain Reward System, interpreted in light of current literature, indicates that problematic pornography use (PPU) operates through the co-optation of dopaminergic pathways, where the pursuit of homeostasis prioritizes virtual stimuli over vital activities. This removes the phenomenon from the purely behavioral or moral sphere, repositioning it as a pathology of altered incentive salience, which explains users' difficulty in breaking the habit despite evident harms.

The structural alterations observed in the prefrontal cortex provide insights into deficits in inhibitory control and decision-making. Unlike 'recreational use,' 'problematic use' appears to induce cognitive rigidity that perpetuates a potential 'vicious cycle.' Furthermore, the phenomenon of sexual desensitization can be understood as maladaptive learning: virtual hyperstimulation raises the pleasure threshold, potentially making interaction with real partners biologically less satisfying. This elucidates the etiology of sexual dysfunctions (such as

DOI: 10.36489/saudecoletiva.2026v17i106p19750-19765

pornography-induced erectile dysfunction) and social isolation, suggesting that treatment may need to focus on resensitizing reward valuations.

Evidence on neuroplasticity indicates that just as the brain adapts to impulsive processes, abstinence and psychotherapeutic interventions (such as CBT and ACT) can promote structural and functional recovery. However, the clinical application of these findings faces barriers due to the lack of nosological standardization and unified diagnostic criteria. Furthermore, a critical limitation of the reviewed literature is the homogeneity of the samples (predominantly male and heterosexual), which prevents the generalization of neuropsychological mechanisms to women and other sexual orientations, highlighting a gap for future research.

CONCLUSION

The present study meets its proposed objective by demonstrating that problematic consumption of pornographic material induces neurobiological and cognitive changes analogous to those seen in substance use. The analyzed evidence indicates that excessive exposure may cause dysfunctions in the Brain Reward System (marked by hyperactivity in response to virtual stimuli and desensitization to natural rewards) and volumetric reduction in the prefrontal cortex. Such neuroplastic changes are likely correlated with impairments observed in executive functions, specifically in decision-making, inhibitory control, and emotional regulation, negatively impacting quality of life and relationships.

However, significant gaps were identified, such as the absence of standardized diagnostic criteria and the homogeneity of the samples, which were predominantly male, limiting the generalizability of the results. It is therefore suggested that future research prioritize longitudinal studies with populations diverse in terms of gender and sexuality, particularly investigating the reversibility of brain changes. These data are valuable for consolidating effective therapeutic protocols and promoting formal recognition of the pathologies associated with this behavior.

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We would like to thank the Faculty of Balsas (UNIBALSAS) for its institutional support and Professor Cândida Helena Lopes Alves for her guidance and encouragement during the course of this research. The authors note that a preliminary, abridged version of this study was presented at the institution's Scientific Initiation Meeting (ENAPIC).

This study was conducted with support from the Faculty of Balsas (UNIBALSAS), through the Scientific Initiation Program (PIC), in the form of a research incentive grant.

The authors declare that there are no conflicts of financial interest or affiliations that may have influenced the conduct or presentation of this study.