Impact of Pornography on Adolescent Neurodevelopment (Aged 13–18 Years): Literature Review

Impacto da Pornografia na Formação Neurológica dos Adolescentes de 13 a 18 Anos: Revisão Bibliográfica
Impacto de la Pornografía en el Neurodesarrollo de Adolescentes de 13 a 18 Años: Revisión Bibliográfica

RESUMO
Objetivo: Analisar os impactos da exposição à pornografia no desenvolvimento neurológico de adolescentes de 13 a 18 anos, com ênfase nas alterações estruturais e funcionais cerebrais. **Método:** Revisão integrativa da literatura realizada nas bases SciELO, PubMed e Google Scholar, incluindo estudos publicados nos últimos vinte anos que abordaram efeitos neurobiológicos e comportamentais da exposição à pornografia em adolescentes. Os dados foram organizados por eixos temáticos relacionados ao sistema de recompensa, neurotransmissores, controle de impulsos e regulação emocional. **Resultados:** Os estudos indicam associação entre consumo frequente de pornografia e alterações no sistema de recompensa cerebral, especialmente em vias dopaminérgicas, além de possíveis impactos no controle inibitório, na tomada de decisão e na regulação emocional. Observam-se ainda correlações com sintomas ansiosos, depressivos e comportamentos compulsivos. **Conclusão:** A exposição precoce e recorrente à pornografia pode influenciar o neurodesenvolvimento adolescente, ressaltando a necessidade de estratégias preventivas e educacionais baseadas em evidências.
DESCRITORES: Adolescente; Pornografia; Neurodesenvolvimento; Sistema De Recompensa; Saúde Mental.

ABSTRACT
Objective: To analyze the impact of pornography exposure on the neurological development of adolescents aged 13 to 18 years, focusing on structural and functional brain changes. **Method:** An integrative literature review was conducted using SciELO, PubMed, and Google Scholar databases, including studies published in the last twenty years addressing neurobiological and behavioral effects of pornography exposure in adolescents. Data were organized into thematic axes related to the reward system, neurotransmitters, impulse control, and emotional regulation. **Results:** Findings suggest an association between frequent pornography consumption and changes in the brain reward system, particularly dopaminergic pathways, as well as possible effects on inhibitory control, decision-making, and emotional regulation. Associations with anxiety symptoms, depressive manifestations, and compulsive behaviors were also identified. **Conclusion:** Early and recurrent exposure to pornography may influence adolescent neurodevelopment, highlighting the need for evidence-based preventive and educational strategies.
DESCRIPTORS: Adolescent; Pornography; Neurodevelopment; Reward System; Mental Health.

RESUMEN
Objetivo: Analizar los impactos de la exposición a la pornografía en el desarrollo neurológico de adolescentes de 13 a 18 años, con énfasis en alteraciones estructurales y funcionales cerebrales. Método: Revisión integrativa de la literatura realizada en las bases SciELO, PubMed y Google Scholar, incluyendo estudios publicados en los últimos veinte años que abordaron efectos neurobiológicos y conductuales de la exposición a la pornografía en adolescentes. Los datos fueron organizados en ejes temáticos relacionados con el sistema de recompensa, neurotransmisores, control de impulsos y regulación emocional. Resultados: Los estudios indican asociación entre el consumo frecuente de pornografía y

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alteraciones en el sistema de recompensa cerebral, especialmente en vías dopaminérgicas, además de posibles impactos en el control inhibitorio, la toma de decisiones y la regulación emocional. También se observaron correlaciones con síntomas ansiosos, depresivos y conductas compulsivas. Conclusión: La exposición temprana y recurrente a la pornografía puede influir en el neurodesarrollo adolescente, resaltando la necesidad de estrategias preventivas y educativas basadas en evidencia científica.
DESCRIPTORES: Adolescente; Pornografía; Neurodesarrollo; Sistema De Recompensa; Salud Mental.

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INTRODUCTION

Adolescence is a critical period of human development, characterized by intense structural and functional changes in the central nervous system. During this phase, synaptic remodeling occurs, corticolimbic connections are refined, and the prefrontal cortex—a region associated with inhibitory control, planning, and decision-making—progressively matures[1]. The asynchrony between the high reactivity of the limbic system and the still-incomplete maturation of the prefrontal areas contributes to greater sensitivity to rewarding stimuli and greater vulnerability to impulsive behaviors[2].

Parallel to these neurobiological changes, there is a growing presence of adolescents in the digital environment. The widespread availability of mobile devices and easy access to the internet have significantly increased early exposure to sexually explicit content. Recent evidence indicates that frequent pornography consumption may be associated with emotional, behavioral, and relati l changes in adolescents, including a higher prevalence of anxiety and depressive symptoms[3],[4].

In the field of neuroscience, contemporary studies have investigated possible associations between problematic pornography consumption and alterations in the brain's reward system. Research using functional neuroimaging methods suggests changes in the activity of regions related to motivation and reward processing, as well as alterations in connectivity with areas responsible for executive control[5] . These findings reinforce the hypothesis that intense and repetitive sexual stimuli may modulate dopaminergic circuits in a manner similar to other potentially addictive behaviors[6] .

Additionally, recent investigations indicate that problematic pornography consumption during adolescence may be related to patterns of compulsive use and psychosocial variables, including loneliness, poor emotional regulation, and internalization of gender roles[4] . However, part of the literature highlights methodological limitations, such as cross-sectional designs and sample heterogeneity, making definitive causal inferences difficult[3] .

Despite the growth in scientific output in recent years, studies integrating neurobiological, behavioral, and psychosocial evidence specifically in the 13–18 age group remain limited. Thus, there remains a need for a critical synthesis of the available evidence, focusing on the interaction between pornography, the reward system, and cortical maturation during neurodevelopment.

Given this context, the present study aims to analyze the impacts of pornography exposure on the neurological development of adolescents aged 13 to 18, with an emphasis on possible structural and functional brain changes and their behavioral implications.

METHOD

This is an integrative literature review conducted with the aim of synthesizing scientific evidence regarding the impact of pornography exposure on the neurological development of adolescents aged 13 to 18 years.

The literature search was conducted in the PubMed, SciELO, and Google Scholar databases, covering the period from January 2005 to March 2026. Controlled descriptors from the Medical Subject Headings and Health Sciences Descriptors were used, combined using the Boolean operators AND and OR. The search strategies included the following combinations: "Adolescent" AND "Pornography" AND "Brain"; "Adolescent" AND "Neurodevelopment"; "Pornography" AND "Reward System"; "Sexually Explicit Material" AND "Adolescent Brain"; "Dopamine" AND "Behavioral Addiction" AND "Adolescence". Equivalents in Portuguese and Spanish were also used to increase the search sensitivity.

The following inclusion criteria were established: original studies, systematic reviews, and meta-analyses published in Portuguese, English, or Spanish; research directly addressing structural, functional, or neurochemical changes associated with pornography exposure in adolescents; and studies analyzing outcomes related to the reward system, inhibitory control, emotional regulation, or compulsive behavior. Studies with exclusively adult samples, duplicate publications, opinion pieces without an empirical basis, editorials, letters to the editor, and works not directly related to neurodevelopment were excluded.

The selection process occurred in three stages: reading of titles, reading of abstracts, and full analysis of potentially eligible texts. After applying the eligibility criteria, the selected studies were organized into a structured spreadsheet containing: author, year of publication, methodological design, sample characteristics, main findings, instruments used, and identified limitations.

Data analysis was conducted qualitatively and thematically. The findings were categorized into previously defined analytical themes: alterations in the reward system; changes in dopaminergic circuits; impact on prefrontal cortex maturation; associations with anxiety and depressive symptoms; and relationship with compulsive behaviors. The synthesis sought to identify convergences, divergences, and gaps in the contemporary literature.

As this was a review study that used exclusively secondary data available in public databases, there was no need for submission to the Research Ethics Committee, in accordance with current national guidelines for research without direct human involvement.

RESULTS

After applying the eligibility criteria, the included studies were organized into five thematic areas: alterations in the reward system; neurochemical changes; impact on prefrontal cortex maturation; associations with psychological symptoms; and correlation with compulsive behavioral patterns.

In the theme related to the reward system, the studies demonstrated that frequent exposure to pornography is associated with increased activation of the ventral striatum and the nucleus accumbens, regions central to reward processing and motivation[1,2]. Evidence from functional neuroimaging studies indicates hyperresponsiveness to explicit sexual stimuli in individuals with more frequent consumption[3], suggesting possible neural sensitization.

Regarding neurochemical changes, some studies suggest an association between repeated exposure to sexual stimuli and alterations in dopaminergic dynamics, with the possible development of incentive sensitization or reduced responsiveness to natural rewards[4]. However, most studies employ a cross-sectional design, limiting causal inferences[5].

Regarding the maturation of the prefrontal cortex, associations have been observed between problematic pornography consumption and impairments in inhibitory control, decision-making, and emotional regulation[6]. Given that the structural development of the prefrontal cortex extends into early adulthood[7], intense exposure to highly reinforcing stimuli may interact with experience-dependent plasticity processes[8].

On the psychological front, several studies have identified a correlation between frequent pornography consumption and a higher prevalence of anxiety and depressive symptoms[9,10]. However, factors such as family context, religiosity, and prior mental health constitute potential confounding variables[11].

Regarding compulsive behaviors, part of the literature describes patterns consistent with problematic use, including loss of control, a progressive increase in time spent consuming pornography, and functional impairment[12]. However, there is no consensus regarding the classification of pornography as a formal addictive disorder in adolescence[13].

DISCUSSION

The findings of this review indicate that frequent exposure to pornography during adolescence may be associated with functional alterations in neural circuits related to reward and executive control[1,2]. Given that the period between ages 13 and 18 corresponds to a phase of intense synaptic reorganization and myelination of the prefrontal cortex[7], repetitive exposure to highly reinforcing stimuli may influence neural plasticity[8].

The incentive sensitization model proposes that stimuli repeatedly associated with rewards acquire increased motivational salience[4]. In this context, pornography could function as a high-intensity dopaminergic stimulus, favoring repetitive seeking patterns. However, unlike psychoactive substanc-

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es, there is no exogenous introduction of neurochemical agents, which makes classification as a dependency still controversial[13].

The dual-system model suggests a maturational mismatch between the limbic system and prefrontal control during adolescence[6,7]. The hyperresponsiveness of the reward system, combined with the immaturity of inhibitory control, may increase vulnerability to impulsive behaviors[3].

However, interpreting the data requires caution. Cross-sectional studies predominate[5], with measures based on self-report, subject to memory bias and social desirability[11]. Furthermore, the conceptual heterogeneity of "problematic use" compromises comparability across studies[12].

From a clinical perspective, the results suggest the need for preventive strategies based on evidence-based sex education and the development of socioemotional skills[9]. However, multimodal longitudinal studies are needed to better understand the temporal relationship between exposure and neurobiological changes[10].

In summary, although there is consistent evidence of an association between frequent pornography consumption and changes in reward and executive control circuits, it is not yet possible to establish direct causality. The topic remains under scientific consolidation and requires methodological rigor in future investigations.

CONCLUSION

This literature review aimed to analyze the impact of pornography exposure on the neurological development of adolescents aged 13 to 18. The synthesis of the evidence indicates that frequent consumption is associated with functional alterations in brain circuits related to the reward system and executive control, especially in structures involved in motivation, impulsivity, and emotional regulation. These findings suggest that repetitive exposure to highly reinforcing stimuli may interact with neural plasticity processes characteristic of adolescence.

However, the available literature has significant limitations, including a predominance of cross-sectional studies, methodological heterogeneity, the use of self-report instruments, and a lack of standardization in the definition of problematic use. These gaps make it difficult to establish causal relationships and to precisely determine the magnitude of the observed effects.

Thus, there is a need for longitudinal studies with robust designs, the use of multimodal methods such as neuroimaging and standardized neuropsychological assessment, and stratification by age group and intensity of exposure. Future research may contribute to a better understanding of the mechanisms involved and inform evidence-based preventive strategies, especially in the context of public health and comprehensive adolescent care.

REFERENCES

1. Volkow ND, Wang GJ, Fowler JS, Tomasi D, Telang F. Addiction: beyond dopamine reward circuitry. Proc Natl Acad Sci U S A. 2011;108(37):15037–42.

2. Kühn S, Gallinat J. Brain structure and functional connectivity associated with pornography consumption: the brain on porn. JAMA Psychiatry. 2014;71(7):827–34.

3. Voon V, Mole TB, Banca P, Porter L, Morris L, Mitchell S, et al. Neural correlates of sexual cue reactivity in individuals with and without compulsive sexual behaviours. PLoS One. 2014;9(7):e102419.

4. Robinson TE, Berridge KC. The incentive sensitization theory of addiction: some current issues. Philos Trans R Soc Lond B Biol Sci. 2008;363(1507):3137–46.

5. Owens EW, Behun RJ, Manning JC, Reid RC. The impact of internet pornography on adolescents: a review of the research. Sex Addict Compulsivity. 2012;19(1-2):99–122.

6. Casey BJ, Jones RM, Hare TA. The adolescent brain. Ann N Y Acad Sci. 2008;1124:111–26.

7. Blakemore SJ, Robbins TW. Decision-making in the adolescent brain. Nat Neurosci. 2012;15(9):1184–91.

8. Kolb B, Gibb R. Brain plasticity and behaviour in the developing brain. J Can Acad Child Adolesc Psychiatry. 2011;20(4):265–76.

9. Wright PJ, Tokunaga RS, Kraus A. A meta-analysis of pornography consumption and actual acts of sexual aggression in general population studies. J Commun. 2016;66(1):183–205.

10. Grubbs JB, Perry SL, Wilt JA, Reid RC. Pornography problems due to moral incongruence: an integrative model with a systematic review and meta-analysis. Arch Sex Behav. 2019;48(2):397–415.

11. Peter J, Valkenburg PM. Adolescents and pornography: a review of 20 years of research. J Sex Res. 2016;53(4-5):509–31.

12. Brand M, Wegmann E, Stark R, Müller A, Wölfling K, Robbins TW, et al. The Interaction of Person-Affect-Cognition-Execution (I-PACE) model for addictive behaviors: update, generalization to addictive behaviors beyond internet-use disorders, and specification of the process character of addictive behaviors. Neurosci Biobehav Rev. 2019;104:1–10.

13. Kraus SW, Voon V, Potenza MN. Should compulsive sexual behavior be considered an addiction? Addiction. 2016;111(12):2097–106.

DOI: 10.36491/saudecoletiva.2026v17i107p19942-19949