



Review Article

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Parent to Child Transmission of Drug and Alcohol Abuse: A Narrative Review

Riya Mary Richard^{1*}, Deepak Pandit², Sri Anugna Miriyala³, Sayantika Ghosh⁴, Mahin Sheikh⁵, Sanobar Shariff² and Burhan Kantawala²

¹Faculty of Medicine, Ivane Javakishvili Tbilisi State University, Tbilisi, Georgia

²Faculty of General Medicine, Yerevan State Medical University, Yerevan, Armenia

³Faculty of General Medicine, Kamineni Institute of Medical Sciences, Narketpally, India

⁴Department of microbiology and immunology, Georgetown University, USA

⁵Faculty of General Medicine, Ameer-ud-Din Medical College, Lahore, Pakistan

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***Corresponding author:** Riya Mary Richard, Faculty of Medicine, Ivane Javakishvili Tbilisi State University, Georgia

Abstract

Introduction: Substance misuse, including alcohol and drug use, poses a major public health concern. One overlooked aspect is its transmission from parents to children, leading to multiple disorders and increasing societal prevalence. Parents significantly influence their child's development, with literature revealing a strong familial association of drug abuse transmission. This article aims to explore this issue, identify knowledge gaps, and propose avenues for further investigation, aiding evidence-based interventions, and prevention.

Materials and Methods: A comprehensive search of literature from 2015 to 2022 was conducted using PubMed and Scopus databases. Studies focused on substance abuse and alcohol transmission from parents to offspring. Screening criteria included study design, parental and offspring variables, and specific outcome terms.

Results: The global rise in drug and alcohol misuse has significant long-term and immediate consequences. Factors contributing to this phenomenon include high-stress environments, peer pressure, inadequate parental care, and family instability. Establishing drug rehabilitation centers in key urban areas is essential for treatment and awareness campaigns.

Conclusion: This analysis reveals that parental drug abuse is linked to various behaviors in children, including attention issues, academic underachievement, criminal behavior, and depression. More research is needed to understand the genetic and environmental factors involved in transmission.

Keywords: Drug abuse; Alcohol use disorder; Psychology; Substance misuse; Transmission of psychopathology

Abbreviations: AUD: Alcohol Use Disorder; DA: Drug Addiction; CUD: Cannabis Use Disorder; UNODC: UN Office on Drugs and Crime; SUDs: Substance Use Disorders

Introduction

Substance misuse, encompassing alcohol consumption, drug use, and other harmful behaviors, is a significant public health concern necessitating appropriate attention. An overlooked aspect is its potential transmission from parents to children, leading to multiple disorders and increasing societal prevalence. Parents play a pivotal role in their child's development, directly or indirectly influencing transmission. Literature reveals a robust familial association of drug abuse transmission via a temporal contagion model, with correlated risk linked to geographical proximity [1]. Furthermore, factors such as peer pressure, lifestyle habits, and

environmental influences, including experiences of childhood loneliness and neglect, significantly contribute to the development of substance use disorders in individuals [2]. The susceptibility of young adults to alcohol-related issues may be influenced by genes involved in crucial processes within the nervous system, such as neurogenesis and signal transduction. Extensive research has examined various substances in the context of parent-child transmission. The risk of early alcohol initiation in children was found to be twofold higher when fathers engaged in alcohol and marijuana use, with an additive effect when mothers used tobacco.

Consequently, it has become imperative to delve into the transmission of alcohol and substance use from parents to offspring to gain a deeper understanding of the underlying mechanisms and develop more effective prevention and treatment strategies. However, to date, no comprehensive study has provided detailed insights into the modes of transmission and the most efficacious interventions to curtail it. This article aims to address this gap by comprehensively exploring every relevant aspect pertaining to the prevention of parent-to-child transmission of drug misuse [3,4]. The objectives of this article encompass assessing the current state of research on the transmission of drug and alcohol misuse from parents to children, identifying knowledge gaps, and proposing avenues for further investigation. By undertaking such an endeavor, we aim to enhance our understanding of this critical issue and provide valuable insights for the development of evidence-based interventions and preventive measures.

Methods

Analysis was done on literature available concerning substance abuse and the use of alcohol transmitted from parents to offspring. Studies that were published between 2015-2022 were taken from

PubMed and Scopus databases using a systematic search. The terms used for screening comprised of variables relating to study design such as “multiple-parenting relationships”, “adoption”, “triparental”; parent terms like “father”, “parent”, “mother”, “paternal”, “maternal”; offspring variables which included “child”, “offspring” and finally topic terms such as “drug”, “substance”, “alcohol”. Search words that were outcome-specific were searched in order to limit our review to a distinct set of characteristic traits. Furthermore, the search was restricted to scientific articles that were published in English. Articles were obtained that yielded 233 results. After the removal of duplicates, our overall search gave 135 hits. The references in each of the articles selected from the preliminary search were also reviewed to select any article that further highlighted and gave a deeper insight into the topic. In this review, 37 articles were included. Children’s ages ranged from 0 months to 21 years. This narrative review exclusively incorporates studies that adhere to the following criteria: (1) a comparison between parental traits and offspring performance, (2) utilization of an informative design that is genetically derived, and (3) an assessment of children’s phenotype related to substance abuse, alcohol use, or associated traits (Figure 1).

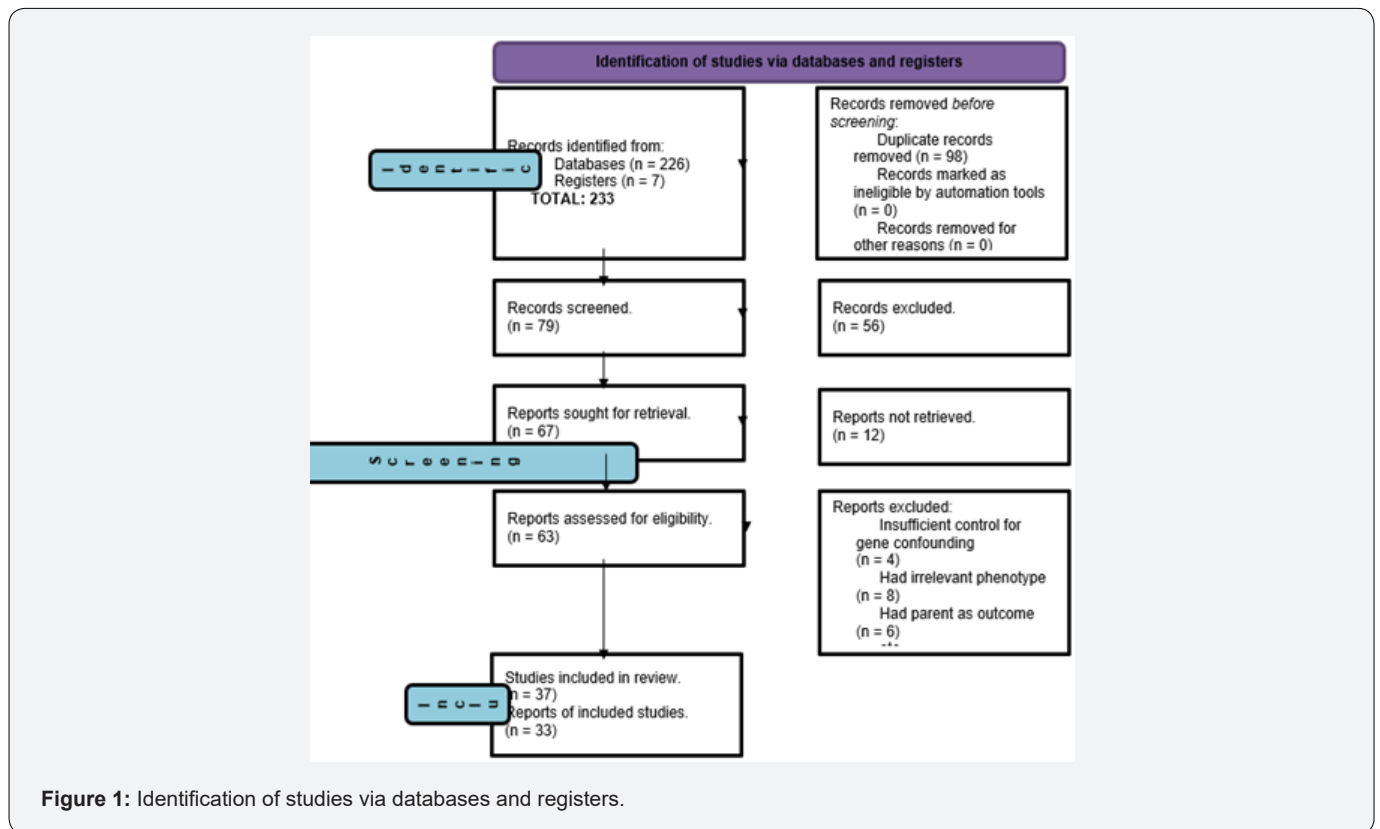


Figure 1: Identification of studies via databases and registers.

Types of Substance Abuse

Through adolescence and into early adulthood, there is an increasing prevalence of both legal and illegal drug use, and substance abuse disorders often start in late youth or early adulthood [5]. Substances that are typically abused include:

- i. Alcohol
- ii. Opioid (heroin, fentanyl, prescription painkillers)
- iii. Stimulants (cocaine, methamphetamine)
- iv. Depressants (benzodiazepines, barbiturates)

- v. Hallucinogens (LSD, psilocybin mushrooms)
- vi. Cannabis(marijuana)
- vii. Anabolic steroids
- viii. Inhalants (solvents, aerosols, gasses, tobacco)
- ix. Prescription drugs if taken in a manner or dose other than prescribed.

According to research findings, there is a suggestion that fathers who engage in alcohol, marijuana, and tobacco use during their adolescence exhibit a higher likelihood of having partners who are also involved in such practices [6]. This indicates that adults experiencing social and behavioral development challenges may be inclined to choose vulnerable partners, thereby transmitting the adverse effects of substance abuse to future generations through risky social associations [7]. Parental practices such as modeling substance abuse, poor communication, and monitoring have been shown to have a significant impact on a child's substance abuse in adolescence. Studies have found that a parent's history of substance use can predict these factors, leading to a high degree of congruence between a parent's and child's substance use behaviors [8-10]. Empirical evidence suggests that younger generations are initiating alcohol use at a later stage in life compared to their fathers. Notably, this trend appears to be more prominent among daughters than sons, potentially reflecting variations in cultural and social expectations across genders. It has been observed that younger generations are commencing tobacco use at a later stage than their fathers, potentially attributed to heightened awareness of the health hazards associated with tobacco consumption. This shift in behavior may also be influenced by distinct marketing and advertising strategies tailored to different age groups [6].

Association Between Father and Mother on Substance Use Disorders

Research indicates a significant association between substance use disorders (SUDs) in parents and their offspring, particularly in relation to drug and alcohol use. The dynamics of parents' relationships, including divorce, directly or indirectly influence a child's propensity for substance use. Divorce, specifically, has been linked to a heightened risk of drug use and can impede effective parenting practices. The association between divorce/separation and increased substance use underscores the psychological and social risks faced by children in such circumstances [11-12]. Studies have shown that children's marijuana, tobacco, and alcohol use by early teenage years was predicted greatly by the fathers' substance use compared to mothers' [6,13]. The findings suggest that fathers' substance use exerts a stronger influence on children's own substance use. This may be attributed to the role of fathers in setting behavioral examples for their children. Consequently, there exists a substantial correlation between paternal lifetime cannabis use disorder (CUD) and the subsequent alcohol and cannabis usage of their offspring [14]. Additionally, a Swedish study found that parents who had AUD problems gave

rise to offspring with increased chances of death, and death rates were higher when mothers had AUD issues [15]. There is an observed positive correlation between maternal alcohol use during pregnancy and the presence of ADHD in children. Additionally, maternal alcohol use can have adverse effects on the emotional and cognitive outcomes of the child [16]. However, higher maternal education and being in a current relationship with the child's biological father do not show significant associations with alcohol use that may lead to the child's mental health being unaffected [17]. Therefore, it is crucial to consider both parents when assessing the child's risk of developing substance use disorders. Implementing technology-based interventions and training to screen and support individuals with tobacco, depression, and alcohol use can improve detection and provide protection for patients during medical appointments [18].

Parent-Child Psychopathology Associations

Research indicates that women who have substance use disorders often experience interpersonal trauma and insecure attachment. The presence of a substance use disorder during pregnancy and prenatal stages in mothers is associated with adverse outcomes for neonates, fetuses, and young children. Maternal drug use is also connected to psychiatric comorbidities, dysfunctional parenting styles, emotional detachment, impaired reflective functioning, delayed developmental milestones, and disrupted attachment patterns in children. Even after drug use is discontinued or effectively managed, the psychological and relational dynamics that influence parenting formation can be affected, limiting reflective parental performance and complicating the parent-child bond [19]. Researchers have uncovered that maternal alcohol use disorder (AUD) increases the risk of developing alcohol use disorder (AUD) in daughters more than in sons, whereas paternal AUD elevates the risk of AUD and cannabis use in sons more than in daughters [20]. These findings lend support to the notion that psychopathology is transmitted based on sex, beyond solely AUD. In contrast to adoption research, which revealed a weak association between birth mother personality traits and callous, unemotional behaviors in children, a study on children of twins found no genetic correlation between parental control and child externalizing difficulties [21]. Previous research on children of twins suggests that parents who exhibit inadequate parenting behaviors may have children who are predisposed to psychopathology, indicating that both phenotypes may share the same underlying cause. Ultimately, parental exposure to drug use increases the likelihood of children developing substance use disorders (SUDs) and various mental health issues, potentially initiating an intergenerational cycle of psychopathology [19].

Global Prevalence

Global estimates suggest that approximately 2.2% of individuals suffer from substance use disorders, with alcohol use disorders being more prevalent at 1.5% compared to other drug use disorders (0.8% overall) [22]. This includes specific drugs

such as cannabis, opioids, amphetamines, and cocaine, which have varying degrees of prevalence (e.g, cannabis accounts for 0.32% of substance use disorders, opioids for 0.29%, amphetamines for 0.10%, and cocaine for 0.06%) [22]. The likelihood of using alcohol and drugs increases dramatically in subsequent generations, according to various studies [1,4,6,23-27]. With the exception of intellectual disability, which is more common in low-income nations, substance use disorders have been found to be more widespread in high-income countries [22]. Global Drug Report 2022 from the UN Office on Drugs and Crime (UNODC) estimates

that 284 million individuals worldwide between the ages of 15 and 64 took drugs in 2020, a 26% rise from the preceding ten years. Those under 35 make up the bulk of the population in both Africa and Latin America. Adolescent substance use is profoundly influenced by social and environmental factors, such as peer pressure and exposure to substance use [18]. To effectively mitigate teenage substance use, preventive and intervention strategies need to comprehensively consider the significance of these social and environmental elements (Figure 2).



Figure 2: Global Prevalence of Substance Abuse.

Discussion

Our review provides a comprehensive examination of the existing body of literature on the genetic underpinnings of parental alcohol and drug use and its associated outcomes in offspring. This topic elicits considerable interest, and the reviewed studies collectively reveal a significant burden of guilt and trauma experienced by parents, coupled with their apprehension regarding the potential disclosure of drug addiction (DA) or alcohol use disorder (AUD) to their children [28]. Previous studies have indicated the genetic liability for AUD and DA has an impact on the likelihood of suicide attempts and death [29]. Moreover, children raised in families affected by drug and alcohol abuse have reported experiences of abandonment and isolation during their childhood, which contributes to their inclination

towards social connections involving alcohol use, drug addiction (DA), and recovery [2]. Additionally, there is evidence of genetic overlap across different phenotypes. For instance, parental drug and alcohol use has been found to be associated with various externalizing and internalizing characteristics in their children, such as attention problems, lower academic performance, criminal behavior, and depression [21,23-24]. Studies examining alcohol and substance abuse during pregnancy have indicated that fetuses exposed to marijuana in utero exhibit a significant reduction in D2 gene expression in the amygdala. Furthermore, prenatal cocaine exposure is commonly associated with perinatal effects such as prematurity, growth restriction, and low birth weight [30]. Additionally, although the association is weak, there is evidence of a positive link between maternal alcohol use during pregnancy and the manifestation of ADHD symptoms in offspring

[16,31]. Literature findings demonstrate that when drug use is prevalent within the family and household, combined with the presence of shame and discrimination due to HIV infection, there is an increased likelihood of early initiation of drug addiction (DA) and alcohol use disorder (AUD), as well as early engagement in sexual activities during adolescence or young adulthood [32]. Thus, our research suggests that both environmental and genetic

mechanisms contribute to the transmission of DA and AUD traits from parents to their offspring. Furthermore, employing genetically informed study designs to investigate intergenerational transmission proves valuable in understanding the impact on children’s mental well-being and associated consequences, as well as the process of transmission within families (Table 1).

Table 1: Conclusion and study type of each article reviewed in this manuscript.

Author’s name	Year of Publication	Country of Publication	Type of study	Number of subjects used	Conclusion
1. Kendler et al.	2019	Sweden	multiple parenting relationships design	Parents-262,933 Children-770,739	children were likely to have DA and AUD problems from parents in following order: gene + rearing >> gene only > rearing only
2. Kerr et al.	2020	USA		Parents-359 Children-223	probability for prior tobacco, alcohol and marijuana use onset was passed on from paternal side to offspring.
3. Nadel et al.	2017	USA		Fathers-343 Mothers-186 Children-624	Paternal drug usage during teenage years is an essential threat for offspring’s behavioral problems. In the case of mothers, using drugs during adulthood is a risk factor.
4. Almquist et al.	2020	Sweden	Prospective cohort study	Children-14,608	Transmission of misuse of alcohol from parents can be overcome by children performing above average in schools.
5. Kendler et al.	2020	Sweden		Parents-48,475 Children-53,846 Cousins-36,215	Close household relationships transmit AUD.
6. Epstein et al.	2020	USA	Data from 2 linked longitudinal studies	Families-380	Parents who started marijuana use during teenage years, whether chronic or teenage limited; had children who were more prone to use substances.
7. Rothenberg et al.	2020	USA		Families-454	Good grades in school, positive activity and actively coping anticipate lower rates of adolescent cannabis use at later stages.
8. Tiberio et al.	2020	USA	Prospective study	Parents-1081 Children-971	Preventing cannabis use during adolescence in one cohort might procure prevention perks for the next one.
9. Ijadi-Maghsoodi et al.	2019	USA		Parents-41	Increased levels of guilt and damage were seen among parents and their anxiety in disclosing substance use to children.
10. Kerr et al.	2020	USA		Parents-247 Children-216	Parents prescribed opioid use and misuse resulted in child’s alcohol, marijuana and tobacco use by early teenage years.
11. Meulewaeter et al.	2022	Belgium	qualitative research design	Participants-17	Children raised in families with substance use disorders faced isolation and neglect during their childhood.
12. Meulewaeter et al.	2019	Belgium	qualitative research design	Mothers-23	Maternal use of drugs transmitted trauma to their offspring.
13. Long et al.	2018	Sweden		Participants-1,007,333	Parents who had AUD had offspring with aggression, criminal behaviour etc.
14. Kendler et al.	2021	Sweden		Participants-7,661,519	There is an increased possibility to attempt suicide in people who use drugs and alcohol
15. Kendler et al.	2018	Sweden		Participants-3,257,987	Using hereditary and geological mechanisms DA traits are sought to be passed on from parents to children.
16. Jami et al.	2021		systematic review	no data on number of subjects	It is useful to use genetically derived designs to study transmission of AUD and SUD from one generation to next.
17. Jacquelyn et al.	2021	England		Mothers-139	Fetuses exposed to substances are known to have low birth weight, growth restriction etc.

18. Espen et al.	2017	Norway	Cohort study	Mothers-94, 907 Children- 114 ,247	A weak but positive link was seen in mothers who used alcohol at the time of pregnancy and child's ADHD signs.
19. Hill et al.	2018	USA	Prospective study	Adolescents-363	Parents with the problem of cannabis use disorder present a huge risk for cannabis use during teenage years in children.
20. Henry et al.	2017	USA		Dyad of paternal-offspring -274	Fathers who had cannabis use disorder had a probability of having children who commenced use of alcohol by 15 years of age.
21. Kresina et al.	2017	USA	Review article	No data on number of subjects	Household using drugs combined with shame and bigotry of HIV infection provided an increased possibility for prior commencement of DA and AUD, along with sexual launch during teenage or young adulthood.
22. Rochat et al.	2019	South Africa		Mothers and care-givers- 1505 no data on number of subjects Children- 1536	Children may be at risk of poor mental health, problems related to behavior and bad outcomes at school when parents' drinking trait is transferred to them.
23. Castaldelli-Maia et al.	2022	USA		no data on number of subjects	Excessive levels of SUDs were reported in high income countries.
24. Holst et al.	2020	Denmark	Prospective cohort study	Parental AUD offspring-9948 Reference offspring-98,136	Children express AUD symptoms if their parents were inclined towards having AUD.
25. Westman et al.	2022	Sweden		Parents-4,817,993 Children-2,421,479	The AUD of parents presents great risks for a child's death due to causes such as alcohol or drug use.
26. Madras et al.	2019	USA	Cross-sectional study	Dyads of maternal-child/paternal-child-24,900	Maternal usage of marijuana is an essential element in the development of teenage offspring.
27. Nepl et al.	2020	USA		Participants-218	Traits like harshful parenting, emotional suffering and SUD were transmitted to children.
28. Chris Elkins, MA	2020	USA		no data on subjects	Behavioral therapy, family counseling are used effectively by Rehab centres to treat SUD.
29. Scott et al.	2018	USA		Cannabis users-2152 (males-1472) Comparison participants-6575	A positive relation was seen with use of cannabis and decline in cognitive functioning.
30. Edwards et al.	2015	U.K.		Participants-4304	Hereditary factors play a pivotal role in youths' alcohol problems.
31. Capaldi et al.	2016	USA		Parents-93 Fathers-90 Mothers-85 Children-146	Maternal drug usage contributes a good percentage to development of such problems in their children.
32. Cioffi et al.	2021	USA		Fathers-426	Getting divorced or separated makes fathers prone to use drugs and alcohol.
33. Gómez-Restrepo et al.	2021	Columbia		Patients-16,188	Young men comprised a major proportion related to unhealthy alcohol usage.
34. Woo et al.	2022	USA		Participants-8,506	Smoking in beginning of midlife was stronger for black than white males and females
35. Elam et al.	2016	USA		Families-380	Increased levels of substance use were found in adolescents towards emerging manhood.
36. Meier et al.	2017	USA		College students-821	Using butane hash oil is linked with high dependence on cannabis
37. Etemadi et al.	2022		review	No data on number of subjects	Misusing drugs during pregnancy can have an impact on offspring's neurodevelopmental growth.

Future Recommendations

Presently, there is a global escalation in the prevalence of drug and alcohol misuse, resulting in both enduring and immediate ramifications. The etiological factors contributing to this phenomenon vary across nations, cities, and individuals. High-stress environments, peer pressure, inadequate parental care or indifference towards children, and family instability, among other factors, emerge as significant contributors to the development of alcohol use disorder (AUD) and drug addiction (DA) [1]. The key factor contributing to parent-child transmission of substance use is a lack of parental awareness regarding the detrimental consequences of drug and alcohol abuse on their future offspring. A significant proportion of young individuals initiate substance use solely for recreational purposes and to enhance their social status, often unaware of the potential repercussions. The most effective approach to prevent teenage substance use is to foster the development of their social and personal skills. These skills encompass the ability to effectively navigate challenging situations (i.e., emotional regulation), achieve academic success (i.e., cognitive competence), and engage in positive activities such as clubs, sports, and volunteer work [26,33].

The authors recommend the usage of evidence-based interventions such as counseling and therapy which may be employed as effective strategies for addressing addiction. The primary objective of addiction treatment and counseling is to target the underlying issues that contribute to the condition, with the aim of preventing relapse. Behavioral therapy, motivational therapy, and family counseling are widely recognized therapeutic approaches utilized by rehabilitation centers to effectively address substance use disorders [34]. It is imperative to establish drug rehabilitation centers in key urban areas across the country, as these centers serve a dual purpose: providing comprehensive treatment for individuals with substance use disorders and conducting targeted awareness campaigns on drug abuse, particularly in areas with a high prevalence of alcohol use disorder (AUD) and drug addiction (DA).

Limitations

One concern regarding the measurement of parental alcohol abuse is the variation in the duration of the original studies. Only a few studies included in our analysis combined these time periods in their research [6, 23-24]. Another limitation is the small number of participants and the reliance on inpatient care data, which primarily includes severe cases [14,19,23]. One study examined the relationship between parental alcohol use disorder (AUD) registration and the subsequent registration of AUD in their offspring. However, transmission occurred prior to registration, making it an imprecise indicator of the onset of AUD [25]. It is likely, though not certain, that alcohol use during pregnancy is underreported due to the social stigma associated with it [16]. Lifestyle factors such as strong sibling relationships, participation in self-help programs, and individual characteristics including smoking, dietary habits, and exercise were not addressed [15].

The long-term diagnosis of cannabis use disorder (CUD) was not tracked, and the extent of exposure of young individuals to parental cannabis use remains unclear. Grades obtained during adolescence may serve as proxy variables for protective factors (such as dedication to education, avoidance of problematic peers, and strong cognitive functioning) that may reduce cannabis use [35]. Future studies conducted in a legal marijuana setting may reveal patterns that were not apparent when marijuana use was prohibited. The effects of genetic and other neurobiological factors on cannabis use are currently not measured in research, which hampers the exploration of familial influences. Some studies only reflect the general demographics of parents experiencing homelessness [28]. These measurements were taken before the legalization movement and the increase in cannabis potency [36]. It is possible that as recreational cannabis use becomes more prevalent and potent, it may increasingly interfere with parenting [37]. Future research should focus on the generalizability of these results to individuals from diverse demographic and racial/ethnic backgrounds. Additionally, the justifications for initial prescription (e.g., surgery) and the patients' experience of physical discomfort were not evaluated. There was insufficient variation to include long-term or developmentally specific outcomes (e.g., consequences of prescription opioid misuse throughout children's development) and the frequency of prescription opioid misuse and opioid use disorder. The impact of socioeconomic status on the study results remains unclear due to a lack of data on family socioeconomic status [2].

Conclusion

In conclusion, this research aimed to explore the relationship between parental alcohol use disorder (AUD) and drug addiction (DA) and the transmission of traits to offspring. Based on a comprehensive analysis of the literature, it can be concluded that parental drug abuse is associated with various internalizing and externalizing behaviors in children, including attention issues, academic underachievement, criminal behavior, and depression. The risks of developing AUD, drug misuse, and engaging in criminal conduct differ between boys and girls based on maternal and paternal AUD. There appear to be sex-specific components involved in the transmission of psychopathology within the externalizing spectrum. Drug abuse during pregnancy can have significant implications for the mental health of the fetus. Furthermore, researchers have also identified that AUD spreads through a contagious environmental process that occurs within families and is likely facilitated by the exchange of expectations and role models associated with heavy drinking. Further studies are needed to elucidate the critical roles played by both genetic and environmental factors in transmission processes.

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