

The relationship between delinquency and the use of psychoactive substances in adolescence: an integrative literature review

Relações entre delinquência e uso de substâncias psicoativas na adolescência: revisão integrativa da literatura

Relaciones entre delincuencia y consumo de sustancias psicoactivas en la adolescencia: una revisión integrativa de la literatura

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Abstract

Substance use and delinquency are behaviors that may maintain a strong and complex relationship, with a need to further investigate the possible processes and relations within the "crime-drug relationship." This integrative review aimed to identify and evaluate the available evidence concerning the following question: what are the relationships between substance use and delinquency and the processes of influence between these two behaviors? Searches were conducted in the LILACS, JSTOR, PsycINFO, SciELO, Sociological Abstracts, and Web of Science databases, using the descriptors "substance use" AND "juvenile delinquency". Evidence from eighteen studies suggests a greater likelihood of delinquency preceding substance use for males; substance use acts by fostering conditions for continued involvement in offences over time (persistence of delinquency from adolescence to adulthood), increasing the likelihood of recidivism. The analysis of different types of criminal behavior (normative, serious, violent) and varying levels of psychoactive substance use reveals distinct patterns of interaction between the two behaviors, as well as the relevance of environmental influences. A single deterministic explanatory model is insufficient to account for the complexity and plurality of this relationship.

Keywords: Drug addiction; Crime; Adolescent Development; Human Development.

Resumo

O uso de substâncias e a prática de delitos são condutas que podem manter forte e complexa relação e investigar os processos e relações possíveis na relação "crime-droga" ainda é necessário. Esta revisão integrativa teve como objetivo de identificar e avaliar as evidências em torno da seguinte questão: quais são as relações entre de uso de substâncias e delinquência e os processos de influência entre esses dois comportamentos? As buscas foram realizadas nos bancos de dados LILACS, JSTOR, PsycINFO, SciELO, Sociological Abstracts e Web of Science, utilizando os descritores "substance use" AND "juvenile delinquency". As evidências de dezoito estudos sugerem uma probabilidade maior de que a delinquência preceda o uso de substâncias para o gênero masculino; e que o uso de substâncias atua fomentando condições para a manutenção do envolvimento em delitos ao longo do tempo (persistência da delinquência da adolescência à vida adulta), aumentando a probabilidade de reincidência. A avaliação de diferentes tipos de trajetórias de conduta delituosa (normativa, grave, violenta) e dos níveis de uso de diferentes substâncias psicoativas, propiciou a observação de diferentes relações de influência e a importância das influências ambientais. Apenas um modelo explicativo, determinístico, não é suficiente para explicar essa relação complexa e plural.

Palavras-chave: Adição a drogas; Crime; Desenvolvimento do Adolescente; Desenvolvimento Humano.

Resumen

El consumo de sustancias y la práctica de delitos son conductas que pueden mantener una relación fuerte y compleja, y aún es necesario investigar los procesos y relaciones posibles en la relación "crimen-droga". Esta revisión integrativa tuvo como objetivo identificar y evaluar las evidencias en torno a la siguiente cuestión: ¿cuáles son las relaciones entre el consumo de sustancias y la delincuencia y los procesos de influencia entre estos dos comportamientos? Las búsquedas se realizaron en las bases de datos LILACS, JSTOR, PsycINFO, SciELO, Sociological Abstracts y Web of Science, utilizando los descriptors "substance use" AND "juvenile delinquency". Las evidencias de dieciocho estudios sugieren una mayor probabilidad de que la delincuencia preceda al consumo de sustancias en el caso del género masculino; y que el consumo de sustancias actúa fomentando condiciones para la mantención del involucramiento en delitos a lo largo del tiempo (persistencia de la delincuencia desde la adolescencia hasta la vida adulta), aumentando la probabilidad de reincidencia. La evaluación de diferentes tipos de trayectorias de conducta delictiva

(normativa, grave, violenta) y de los niveles de uso de diferentes sustancias psicoactivas permitió observar distintas relaciones de influencia y la importancia de las influencias ambientales. Un único modelo explicativo determinista no es suficiente para explicar esta relación compleja y plural.

Palabras clave: Adicción a las drogas; Crimen; Desarrollo del Adolescente; Desarrollo Humano.

Introduction

Delinquency and the use of psychoactive substances are risky behaviors that can emerge in adolescence for a significant portion of the population and are, therefore, considered normative (Hamidullah et al., 2020; Marquez-Ramos et al., 2023; Moffitt, 2018). For most people, this occurs as an exploratory activity, considering the psychobiological characteristics, such as immaturity, low self-control and, fallible consequences prediction, as well as some social aspects, such as greater freedom to move around in public spaces and the prominence of peer influence in comparison with the family influence (Basto-Pereira & Farrington, 2023; Moffitt, 2018). For some individuals, however, these behaviors are not exploratory; their frequency and severity are beyond normal, being relatively stable beyond the youth years (Le Blanc, 2009; Moffitt, 2018; White, 2015).

The relationship between the two behaviors - or, synthetically, the “crime-drug relationship” - has been investigated in multiple studies, with current available evidence based on different explanatory models (White, 2015, 2018; Young et al., 2021). There are models that propose a causal relationship of one behavior over another. Models that propose offending as the result of substance use are based on three mechanisms, acting as a criminogenic factor. First, the psychopharmacological effects of substances on these individuals' Central Nervous System may favor the manifestation of aggressive behaviors and offenses. Second, the economic pressure related to the compulsive use of psychoactive substances may explain the need to make money to buy drugs. Third, the contact with criminalized subcultures, through the illegal drug market, may provide an opportunity to commit crimes, specifically the drug dealing itself.

In contrast, there is a model that proposes delinquency as a leading factor to substance

use. This proposition is based on evidence from numerous longitudinal developmental studies that showed that a significant number of adolescents become offenders before starting using substances (White, 2015, 2018; Young et al., 2021). According to this model, individuals who start committing offenses in adolescence are more prone to start using substances after they get extra money from their infractions. This increased risk may be explained by the availability of psychoactive substances in their environment. It is also proposed that some adolescents use substances after they start their criminal activities, in order to manage emotional states, such as tension arising after risk taking. For these individuals, drugs have a coping function, being used to cause sensory alteration and/or “provide energy” to commit crimes (White, 2018).

The cause-effect relationship between crime and drugs, however, is not always consistent with empirical data. Some authors (Basto-Pereira & Farrington, 2023; Le Blanc, 2009) suggest that both behaviors may share a set of risk factors and, therefore, emerge according to a co-occurrence model (Anderberg et al., 2022; Komatsu et al., 2020; White, 2015, 2018). Nevertheless, it is essential to emphasize that offending behavior and drug use do not co-occur for all young people, which suggests the existence of specific risk and protective factors, associated with the developmental trajectories of each of these behaviors, which can differ and inter-influence each other (Anderberg et al., 2022). Therefore, other models address the “crime-drug relationship” as one of reciprocity. These models do not consider a unidirectional causal relationship between the two variables but rather a bidirectional influence. The two conducts may reinforce each other and, thus, increase each other's probability of maintenance or escalation (Le Blanc, 2009).

At the stage of life when the onset of criminal conduct starts to decline, substance use tends

to increase. This may suggest that the use of alcohol and other drugs can postpone the desistance of offending behavior. For example, in a study investigating substance use, delinquency, and incarceration in a sample of individuals aged from 6 to 52 years (Green et al., 2019), substance use increased the risk of incarceration among adolescents and adults. This led to the maintenance of delinquency and substance use. Based on the Chaos Theory perspective, the General Deviance Syndrome Model (Le Blanc, 2009) proposes that drug use and offending behavior may start as a result of exposure to common and specific risk factors. Over time, they often reinforce each other, being intrinsically linked from a given moment onward. The mutual reinforcement of both behaviors may favor the increase of their frequency, diversity, severity and, ultimately, their stability over time. Besides the mutual reinforcement, a deviant conduct may work also as an attractor of another, promoting its manifestation. Rather than a causal relationship, the model denotes probabilities related to the reinforcement and maintenance of the trajectories of both behaviors according to personal and contextual risk and protective factors.

Literature reviews (with or without meta-analysis) regularly highlight substance use, abuse, and Substance Use Disorder (SUD) as predictors of offending behavior, although some studies also highlight other disorders, such as Attention Deficit/Hyperactivity Disorder (ADHD) and Oppositional Deviant Disorder (ODD) (Komatsu & Bazon, 2018; Wibbelink et al., 2017; Yukhnenko et al., 2020). Reviews that focus on the practice of violent offenses also underline the use/abuse and dependence on alcohol and other drugs as a risk factor. They also point out that the relationship between alcohol use/abuse and the practice of violence, and alcohol use/abuse and violent victimization are almost identical (Duke et al., 2018). Some variables are indicated as having a moderating effect, namely: gender, psychotic disorders, and the combined effect of alcohol use/abuse and the use of other drugs (Duke et al., 2018). In the Brazilian context, a literature review identified 16 studies showing a higher prevalence of

substance use, SUD, and conduct disorder (CD) among juvenile offenders, when compared to the reference population (Schneider et al., 2016).

Although bidirectional models suggest that both behaviors can emerge and influence each other in various ways over time, empirical evidence indicates that certain types of relationships are more likely to become established, regardless of the explanatory model adopted (White, 2015). These behaviors may follow a hierarchical sequence, initially manifesting as minor or episodic offending, followed by the use of legal substances. In trajectories marked by the escalation of both behaviors, an intensification of criminal conduct is observed, characterized by a higher frequency—and potentially greater severity—of offences, subsequently followed by increased substance use in terms of diversity, frequency, and volume, including the use of illicit substances (White, Loeber & Farrington, 2008). Substance use also appears to play a role in the maintenance of criminal conduct, potentially hindering or delaying the desistance process typically observed in more normative developmental trajectories. In such normative paths, desistance from delinquency tends to occur in late adolescence or early adulthood, a period when problematic substance use may reach its peak (Kazemian et al., 2009; White, 2015).

Despite the extensive discussion of explanatory models in the literature, the available data do not indicate the consolidation of a single model, nor do they support the existence of a conclusive theoretical model to explain the relationship between delinquency and substance use — all models present both strengths and limitations. Evidence indicates the presence of distinct types of relationships between these behaviors. The main gap, therefore, lies in the need for empirical and longitudinal studies to investigate the existence and nature of these relationships. Although existing literature reviews offer valuable contributions to understanding the “crime–drug relationship”, most of them comprise primary studies using a cross-sectional design based on correlational analyses, which limits the scope of

the conclusions. In order to move forward, it is necessary to try to understand the relationship between both behaviors and their interactive processes over time, analyzing 'if' and 'how' changes in the patterns of one influence the pattern of the other. This complexity implies focusing on more complex studies with longitudinal designs. The present study aims to make a contribution in this direction, dealing with longitudinal studies on "crime-drug relationship", identifying and evaluating evidence to respond to the question: what are the relationships between substance use and delinquency and the influence processes between these two behaviors? The initial hypotheses were the following: a) both behaviors would exhibit a positive, strong, and significant relationship, mutually influencing each other in the studies reviewed; b) it would be possible to identify relational processes linking both behaviors, such as manifestation, acceleration, desistance, and maintenance - based on what has been described in the literature; c) delinquency would emerge prior to substance use; d) Substance use would contribute to the persistence of delinquent behaviors by playing what the literature refers to as a maintenance role, thereby reducing the likelihood of normative desistance.

Method

Data Collection Procedures

This study is an integrative review, which aimed to organize, synthesize and integrate knowledge from different areas (such as Criminology and Psychology), in order to help build new perspectives and identify related and different themes and relationships, adopting a methodology with search, evaluation and analysis criteria that would allow its replication (Grant & Booth, 2009; Page et al., 2020; Sataloff et al., 2021). The search for studies was conducted in two moments. A first search was conducted in September 2019, and an update was carried out in April 2024. In the first search, the Lilacs, Jstor, PsychInfo, Scielo, and Sociological Abstracts databases were used; and in the update, the same databases were accessed, with the addition of the Web of Science database. PsychInfo was chosen for

covering content from the areas of Psychology, Psychiatry, and Social Sciences, in addition to indexing journals organized by the American Psychological Association (APA); LILACS (Latin American and Caribbean Literature on Health Sciences), Scielo (Scientific Electronic Library Online) for prioritizing Latin American journals and materials; Jstor for containing knowledge concerning the humanities area, including Psychology and Criminal Justice; and finally Sociological Abstracts, which has as covered themes the use, abuse, and dependence on drugs, including studies from the area of Social Work, Human Biology, Psychology, Sociology, and Violence studies. To update the review, it was considered that the Web of Science database should also be included, since it is characterized as a multidisciplinary database, covering the most cited journals in Social Sciences and Humanities, Law, and Psychology.

The string of search terms was "juvenile delinquency" AND "substance use". The term "juvenile delinquency" was chosen to describe the theme of young involvement in offenses. The choice of this term was based on after reading articles in this area and consulting the APA THESAURUS system, which provides an index of terms and their definitions to be used in bibliographic research. "Substance use" was chosen after reading articles in this area. APA THESAURUS system's suggestion was "substance use disorder". As this term refers to a "more problematic" pattern of use, we have decided to keep a more general term - "substance use" -, since this review's interest was to verify relations between different patterns of offending behaviors and substance use in adolescents, in terms of onset, frequency, and severity, and not only the patterns related to a more serious problem.

For a pre-selection of the studies, the following criteria were employed: a) articles published in journals (focusing on more rigorous production, published in the main journals worldwide); b) in the first search, articles published in the five-year period prior (between January 2015 and September 2019) were included, aiming to prioritise more recent literature, as older studies generally adopted

causal perspectives on the relationship between the two behaviors. In the second search (update), studies published from October 2019 to April 2024 were included. As for the Web of Science database, the search covered the entire period from January 2015 to April 2024. c) articles published in English, Spanish, or Portuguese. Initially, in the identification stage, 511 publications/articles were identified, as presented in Figure 1 (Page et al., 2020).

The titles and abstracts of these publications were read to exclude studies not pertinent. Thus, 316 records were eliminated, and 195 articles were selected for further evaluation. In this stage, the following inclusion criteria were applied: a) to be an empirical study, b) to be a study using a quantitative methodology, c) to be a longitudinal study or with longitudinal database analysis, providing results regarding the development of behaviors (Basto-Pereira & Farrington; 2019), d) to be a study that investigated the relationship between substance use and delinquency.

Studies that referred to intervention evaluations—such as clinical trials or other types of intervention studies—were excluded, since the aim was to understand the processes inherent to the relationship between both behaviors, rather than outcomes influenced by structured interventions. It is worth noting that one of the studies included did not measure substance use in the group of adolescents studied, who had been recruited in the context of treatment for SUD. However, he presented a comparison of this data with data from a sample of young people from the general population,

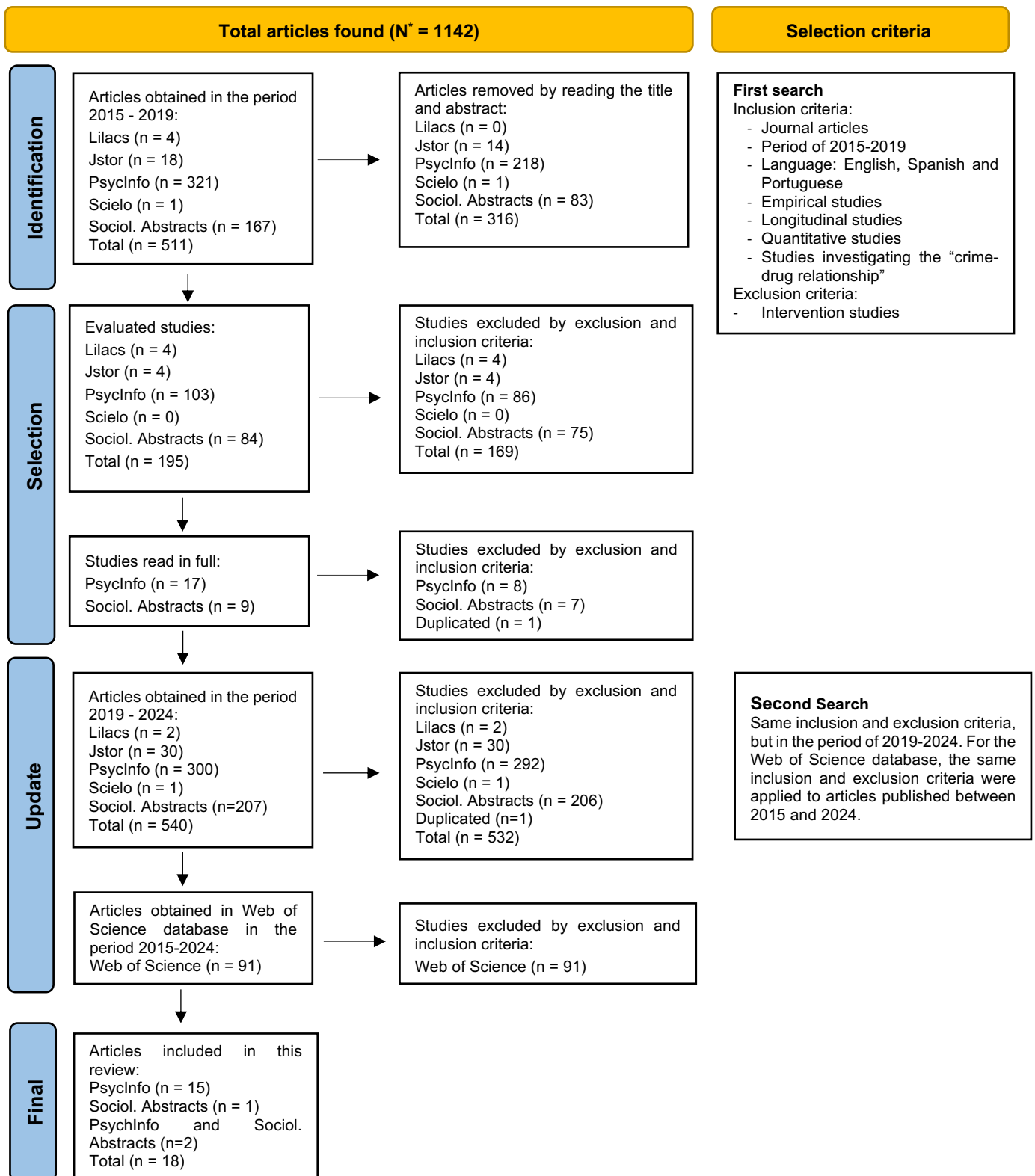
allowing him to assess the relationship between substance use and offending behavior (Molero et al., 2015).

Thus, applying the criterias, 169 studies were excluded, and 26 were selected, which were read in full. From this more detailed appreciation, only 10 articles retrieved from PsychInfo (n=8), Sociological Abstracts (n=1) and both databases (n=1) were chosen for analysis, as presented in Figure 1. When the review was updated, a new search was conducted in April 2024, following the same steps, descriptors, and criteria previously indicated, covering the period between October 2019 and April 2024. Thus, eight more articles/papers were selected: seven of them recuperated from PsychInfo, and one recuperated from PsychInfo and Sociological Abstracts, as indicated in the update stage in Figure 1.

At this point, we focus on the Web of Science database too, due to its scope, as already mentioned. Following the step-by-step process described above, the period from January 2015 to April 2024 was covered and, thus, 91 studies were obtained, using the same descriptors across the same databases. However, none of them could be included, according to the criterias established. Therefore, the final total number of articles/papers considered in our integrated review was 18: fifteen of them retrieved from PsychInfo, one from Sociological Abstracts, and another two from both databases.

Figure 1

Diagram for the survey and selection of articles included in the review



Legend: *N = Total number of articles obtained in the identification and updating phases

Data Analysis

The main information of the studies was transposed to a spreadsheet with information categories, such as: title, authors, year, name of the journals, authors' country of origin, objectives, collection instruments, sample size, sample characterization, databases analyzed, data analysis strategy, main results, limitations and conclusions. After transposing and reading the data collected, summaries of general information were made, such as objectives, sample segment, database, sample size, and type of analysis employed. With the data transposed into the spreadsheet, it was also possible to perform quantitative assessments of the percentages and other data related to descriptive statistics such as the mean, standard deviation, and median of the sample size.

Then, qualitative assessments were carried out covering the journals main themes and themes that stood out in the studies, concerning the "crime-drug relationship", such as the emergence, acceleration, desistance, and maintenance of the conducts. Through thematic analysis (Braun & Clarke, 2006), it was possible to list categories for data description, synthesis, and appreciation. The categories were previously established and guided the appreciation of the result, because certain themes stand out in the literature, such as the different trajectories of the conducts in focus, comparing them according to gender, and the relationships and processes triggered by these conducts. The categories established cannot be used to catalog the studies exhaustively, but rather to synthesize their main contributions, considering the research question.

Results

Descriptive data

Of the studies analyzed, three were published in the years 2015 and 2023 (17% each), and only one in the years 2020 and 2022 (5% each). In the other years, from 2016 to 2019, and in 2021, two studies were published in each one (11%). The articles were published in journals whose main themes were "substance use" (n=6), "childhood, adolescence, and

development" (n=5), "criminology and juvenile justice" (n=6) and "child abuse and neglect" (n=1). Thirteen studies were from authors from the United States (USA), two from Swedish, two were partnership studies between authors from USA and Canada, and USA and Israel, respectively, and one was partnership study between authors from Swiss and Danish. So, it shows the prevalence of publications from the USA. However, the authors' nationalities don't exactly relate to the nationality of the samples studied, as will be further explained. Table 1 summarizes the studies analyzed according to the authors, publication year, and their respective objectives.

The studies basically investigated the substance use and offending behavior in samples of the general population (n = 9) and of the adolescent offenders (n = 9). Among the studies that analyzed data from general population, some investigated specific populations, such as African Americans and Puerto Ricans (Brook et al., 2015), twins (Laursen et al., 2017), recently emancipated adolescents from foster care institutions (Shpiegel et al., 2016), having as comparison adolescents from the general population, and adolescents with a diagnosis of SUD (Molero et al., 2015).

Among the studies that investigated samples of adolescent offenders, two articles reported studies with adjudicated adolescents (Craig et al., 2019; Weber & Lynch, 2021), two with samples of 'serious offenders' (who reported more serious offenses like property and car theft, and violent offenses, such as robbery, rape, and more serious assaults) - one of them with adolescents that had been recently apprehended and formally prosecuted (Drazdowski et al., 2015), the other with adolescents on 'probation' (Denney & Connor, 2016). Other studies also investigated young people who had recently been released from liberty deprivation and were on 'probation' (Walters, 2018), who had experienced their first contact with the Juvenile Justice System (Holloway et al., 2022), and who had referred to a forensic outpatient clinic by the courts (Aebi et al., 2021).

Table 1*Summary of general objectives according to authors and year of publication*

Authors	General objective of the study
Aebi et al. (2021)	To evaluate a newly developed cumulative measure for substance use problems as a predictor of criminal recidivism in youth.
Bright et al. (2017)	To explore patterns and relationship between delinquency and substance use during adolescence, focusing on gender similarities and differences.
Brook et al. (2015)	To examine the joint trajectories of depressive symptoms and antisocial behavior as predictors for substance use disorders in the transition period from adolescence to adulthood.
Cauffman et al. (2023)	To investigate whether there are patterns of offending nine years after the first arrest in adolescence, and to identify whether there are factors in the baseline that predict these different patterns of offending.
Craig et al. (2019)	To investigate the interrelationship between substance use, mental health and recidivism in order to determine if these issues can mediate the relationship between adverse childhood experiences and recidivism.
Denney et al. (2016)	To examine whether specific substances can predict specific types of offences (violent and non-violent) in a group of serious juvenile offenders.
Drazdowski et al. (2015)	To investigate the profiles/patterns of drug/prescription drugs in juvenile offenders and examine whether these different patterns could predict future delinquency.
Holloway et al. (2022)	To examine whether peer deviance and substance-related consequences would be associated with reoffending in a sample consisting of young people of different races and genders.
Kim et al. (2019)	To examine three competing relationships between crime, mental health and substance use in order to understand differences in these relationships according to gender and developmental stage.
Laursen et al. (2017)	To investigate the spread of antisocial behavior (substance use and delinquency) between twin brothers.
Molero et al. (2015)	To compare the criminal trajectories of individuals who received treatment for SUD* and individuals from the general population.
Shpiegel et al. (2016)	To examine reciprocal relationships between delinquency and substance use in adolescents who were becoming emancipated, from the foster care system.
Staff et al. (2020)	To identify proximal links between e-cigarette use and indicators of adjustment, delinquency and other substance use.
Tolou-Shams et al. (2023)	To examine whether psychiatric symptoms and substance-related problems are predictors of recidivism in first-time justice-involved youth.
Turner et al. (2018)	To assess reciprocal associations between drunkenness, drug use and delinquency in a prospective, age-homogenized manner, using an analysis strategy that separates intra- and interpersonal variance.
Walters (2018)	To test the effectiveness of predicting drug use to decelerate offending and offending to decelerate drug use.
Walters et al. (2023)	To clarify the mechanisms responsible for the Worst of Both Worlds (WBW) effect (concomitant patterns of substance use and offending), exploring the relationships between moral neutralization, cognitive impulsivity and their interactions as mediators in the relationship between WBW and offending.
Weber et al. (2021)	To assess gender differences in the relationships between cumulative adverse childhood experiences, substance use severity, and recidivism in a sample of juvenile offenders in a rural area.

Legend: *SUD = Substance use disorder

The studies' sample size ranged from 142 to 28,047, with the sum of all participants resulting in a total of 53,349, a mean of 2,963 participants, a standard deviation of 6,778 participants, and a median of 804 participants.

Of the studies investigating young people from the general population (with a total of 20,368 participants), the mean was of 2,263, with a standard deviation of 3,575, and a median of 816 participants. The studies that investigated

young offenders (with a total of 32,981 participants), the mean was of 3,664, the standard deviation was of 9,152, and the median was of 524 participants. The participants' nationality was predominantly American (n = 13), followed by Swedish (n = 2), Swiss (n = 1), British (n = 1), and Canadian (n =

1). The quantitative analyses employed which stood out the most were regression (n = 11) and correlation (n = 7) analyses. Table 2 presents the summary of information regarding the population studied, the longitudinal database analyzed, the sample number, and the type of data analysis.

Table 2
Summary of general information on the studies analyzed

Authors	Sample	Database	N*	Data analysis
Aebi et al. (2021)	Adolescents from a forensic outpatient clinic	Not mentioned	142	Regression analysis
Bright et al. (2017)	Adolescents from general population	Project on Human Development in Chicago Neighborhoods (PHDCN) - USA [†]	803	Latent transition analysis
Brook et al. (2015)	African American and Puerto Rican adolescents from general population	The Harlem Longitudinal Development Study - USA [†]	816	Logistic regression analysis
Cauffman et al. (2023)	First-time justice-involved male adolescents	Crossroads Study - USA [†]	1216	Latent class growth analysis and multinomial logistic regression
Craig et al. (2019)	Judicialized adolescents	Florida Department of Juvenile Justice (FDJJ) - USA [†]	28.047	Correlation analysis and multiple mediation models
Denney et al. (2016)	Serious juvenile offenders	California Youth Authority (CYA) - USA [†]	524	Logistic regression analysis
Drazdowski et al. (2015)	Serious juvenile offenders	Pathways to Desistance Study - USA [†]	1.349	Analysis of variance and covariance
Holloway et al. (2022)	First-time judicialized youth	Not mentioned	401	Regression and correlation analysis
Kim et al. (2019)	Adolescents from general population	Seattle Social Development Project (SSDP) - USA [†]	806	Cross-lagged correlation analysis
Laursen et al. (2017)	Twins from general population	Quebec Newborn Twin Study - Canada	628	Correlation analysis
Molero et al. (2015)	Adolescents from the general population and treated for SUD [‡]	Statistics Sweden - Sweden	3.068	Growth mixture models
Shpiegel et al. (2016)	Newly emancipated adolescents from foster care	Multi-Site Evaluation of Foster Youth Programs (MEFYP) - USA [†]	429	Negative binomial regression analysis
Staff et al. (2020)	Adolescents from general population	Millennium Cohort Study – United Kingdom	11.564	Logistic regression analysis
Tolou-Shams et al. (2023)	First-time justice-involved adolescents and an involved caregiver	Epidemiological Project Involving Children in the Court (Project EPICC) - USA [†]	361	Analysis of bivariate associations and negative binomial regression
Turner et al. (2018)	Adolescents from general population	Longitudinal Research on Development in Adolescence (LoRDIA) - Sweden	1.409	Binomial and cross-lagged correlation analysis
Walters (2018)	Adolescents released from custody, on parole	California Youth Authority - USA [†]	524	Negative binomial regression analysis
Walters et al. (2023)	Adolescents from general population	Pocono Bullying Study - USA [†]	845	Regression analysis, analysis of variance and correlation analyses
Weber et al. (2021)	Detained youth from a rural area	Not mentioned	417	Regression and correlation analysis

Legend: *N = Sample Size; [†]USA = United States of America; [‡]SUD = Substance Use Disorder

Another important methodological aspect, appreciated in the analyses, was the way researchers assessed substance use and offending behaviors. Most studies investigated the conducts through self-reports and a small portion of them used official data. Regarding substance use, 16 studies assessed this behavior through self-reports, mainly using scales adapted from instruments. Only one study used data from participants' official records (Walters, 2018), and another did not

measure this behavior (Molero et al., 2015). Regarding the data on offenses, nine studies used self-reports as a data source, also using scales adapted from instruments, and the other eight assessed data from official apprehension and/or repeated offense records. Only one used data from official records and self-reports together (Holloway et al., 2022).

The main evidence from the studies

Table 3 summarizes the main findings of the reviewed studies.

Table 3

Summary of the main results

Authors	Main results
Aebi et al. (2021)	SUD* predicted recidivism, even with the model adjusted for other variables. Youth who presented higher scores of cumulative effects of substance use problems also presented higher chances of recidivism.
Bright et al. (2017)	Three profiles were found in the latent transition analysis: "low risk group" (for manifestation of both behaviors), "previous offending" and "delinquency concomitant to substance use". Differences in class transition were identified according to gender. However, being in the category "delinquency concomitant to substance use" was associated with a very low probability of migrating to the "low risk" category.
Brook et al. (2015)	Four profiles of youth were found, according to the levels of depressive symptoms and offending. The higher these levels in adolescence, greater was the chance of youth presenting SUD* in adulthood. Even so, higher levels of delinquency had a greater contribution than depressive symptoms.
Cauffman et al. (2023)	Four patterns of offending were found: a stable low group, an escalating group, a short-term recidivist group and a persistently high group. One of the variables that proved significant for class membership was substance use. Youth in the short-term recidivism, escalation and persistence groups had higher cannabis use than youth in the stable low groups.
Craig et al. (2019)	Substance use and mental health problems played a mediating role in the relationship between ACEs [†] and recidivism, with substance use being more significant. Differences in the relationships according to gender and race/ethnicity were identified.
Denney et al. (2016)	Sociodemographic variables related to social attachment domain (such as race/ethnicity and type of employment), and substance use were significant predictors of recidivism in early adulthood. Specifically, substances that altered mental state were associated with non-violent crimes, while stimulants were associated with violent crimes.
Drazdowski et al. (2015)	The use of prescription drugs was not associated with recidivism in adolescence, considering drug-related offenses, violent and non-violent. It was possible to observe that the most significant predictor of these classes of offenses was the prior history of these offenses and that the use of alcohol was associated with the practice of violent offenses.
Holloway et al. (2022)	Peer offending and consequences related to alcohol and marijuana use were major predictors of recidivism, even when analyzing the influence of socioeconomic variables and gender. As for the peer network, the perception of the social network by caregivers was significant in relation to recidivism. White non-Latino youth and female participants had the lowest chances of recidivism.
Kim et al. (2019)	Gender differences were found when analyzing the developmental trajectories according to delinquency, substance use and depressive symptoms. For males, it was identified that only the trajectory with previous onset of delinquency was significant, while for females, both substance use and previous delinquency were significant.
Laursen et al. (2017)	Two behavioral spread mechanisms were identified among mono and dizygotic twins in adolescence: I (twin A - delinquency, twin B - delinquency, twin B - substance use) and II (twin A - delinquency, twin A - substance use, twin B - substance use). In any case, delinquency predicted substance use in all cases.
Molero et al. (2015)	Individuals who met criteria for SUD* had higher rates of frequency and diversity of offences, presenting prolonged criminal careers. There were differences in trajectories according to gender. However, the most identified trajectory in the groups that received treatment for SUD* and in the general population, of both genders, was a rare criminal trajectory, marked by numbers of criminal proceedings close to zero.

Table 3. (continued)

Authors	Main results
Shpiegel et al. (2016)	Substance use was not predictive of delinquent behavior at age 18 for adolescents who were emancipating from foster care. However, delinquency was predictive at age 17 for substance use at age 18. Adolescent victims of sexual abuse would be at greater risk for developing problems in both behaviors.
Staff et al. (2020)	Focusing on smoking, three classes of participants were identified: non-smokers (who never smoked), exclusive e-cigarettes users, and both conventional cigarettes/e-cigarettes users. Adolescents who were e-cigarette users at age 14 had worse levels of adjustment, more significant alcohol and marijuana use, and higher rates of offending compared to the general population group, but lower than conventional cigarette users.
Tolou-Shams et al. (2023)	Clinically significant externalizing symptoms and alcohol-related problems predicted recidivism. Alcohol-related problems drove recidivism for youth without clinically significant psychiatric symptoms and externalizing symptoms predicted recidivism, regardless of alcohol-related problems. After accounting for other predictors, cannabis-related problems were more prevalent, however, only alcohol related problems predicted recidivism.
Turner et al. (2018)	At the inter-individual levels, substance use and delinquency showed significant correlation. However, when analysed at the individual (intra-individual) level, the only significant relationships were delinquency predicting substance use between grades 7 and 9, delinquency predicting drunkenness between grades 8 and 9; and drunkenness predicting illicit substance use between grades 7 and 8.
Walters (2018)	It was observed in male youths, at the transition from adolescence to adulthood, that the use of illicit substances was associated with future recidivism, and vice versa. Specifically, the use of illicit drugs predicted violent and nonviolent crimes, while the specific use of alcohol did not. However, nonviolent crimes predicted the use of illicit drugs.
Walters et al. (2023)	Moral neutralization was able to mediate the Worst of Both Worlds effect in which crime and substance use predict greater negative outcomes when compared to just crime or substance use alone. Cognitive impulsivity and its interaction with moral neutralization, in turn, failed to mediate and explain the relationship between WBW and delinquency.
Weber et al. (2021)	Female youths reported higher substance use (and related problems) and number of ACEs [†] than males. In the relationship between ACEs [†] and recidivism, substance use considerably increased the risk of reoffending.

Legend: *SUD = Substance Use Disorder; [†]ACEs = Adverse Childhood Experiences

Through thematic analysis (Braun & Clarke, 2006), it was possible to organize the main information into two categories, namely: a) the trajectories of the crime-drug behaviors and gender, and b) the relationships and processes triggered by the crime-drug behaviors. These are detailed below.

a) The trajectories of the crime-drug behaviors and gender

Most studies have detected different trajectories for both behaviors as well as for both genders. The evidence indicates that, in general, male almost always present higher rates of frequency and severity of both. There is also a greater body of evidence concerning, in terms of deviant behavior trajectory: involvement in offending precedes or is more significant in predicting substance use (Bright et al., 2017; Brook et al., 2015; Drazdowski et al., 2015; Kim et al., 2019; Laursen et al., 2017;

Shpiegel et al., 2016; Turner et al., 2018; Walters, 2018), although there is also some evidence that point out both conducts emerge simultaneously (Bright et al., 2017), and substance use preceded offending conduct (Walters, 2018). Regarding the female gender, both the previous emergence of offending conducts and substance use were found to be significant (Bright et al., 2017; Kim et al., 2019; Molero et al., 2015).

b) The relationships and processes triggered by the crime-drug behaviors

In general, most studies showed that both behaviors were strongly associated and found indications of their influence on the levels of probability, regarding the processes of emergence, acceleration (increased frequency, diversity, and aggravation), desistance (decreased frequency, diversity, and severity), and maintenance of one behavior over the

other. For the male gender, more studies have found evidence regarding the conditions generated by the offending behavior (increasing likelihood) for the emergence of substance use, and in some studies, the results found a unilateral spreading mechanism between both conducts (Kim et al., 2019; Laursen et al., 2017; Shpiegel et al., 2016; Turner et al., 2018).

Regarding acceleration, in terms of frequency, the behaviors were again found to be related: higher incidence rates of one conduct co-occurred with the other. Higher frequencies of reported offenses were associated with higher rates of substance use (Brook et al., 2015) and, similarly, substance use, when at a higher frequency, with more significant scores of associated problems, was similarly associated with a higher frequency of offending behavior and higher odds of repeated offenses (Aebi et al., 2022; Cauffman et al., 2024; Molero et al., 2015; Staff et al., 2020; Tolou-Shams et al., 2023; Walters et al., 2023). Furthermore, the previous history of both conducts at baseline was also shown to be a predictor of higher rates of their occurrence in the future (Drazdowski et al., 2015; Kim et al., 2019; Turner et al., 2018). Diversity was also shown to be correlated, with more classes of substance use reported that predicted higher rates of different offenses reported (Drazdowski et al., 2015; Staff et al., 2020) and higher probabilities of reoffending (Aebi et al., 2021). Regarding aggravation, it was possible to identify that offending behavior have been shown to be predictive of more problematic levels of the use of alcohol and other drugs (Kim et al., 2019; Turner et al., 2018), while alcohol use (with abuse/intoxication) was shown to correlate with violent/aggressive offending trajectories and reoffending (Aebi et al., 2022; Drazdowski et al., 2015; Turner et al., 2018). Only in one of the studies reviewed this relationship was not identified (Walters, 2018).

Although most studies indicated the offending behavior as a precursor to substance use, part of them allowed identifying the role of the substance use in the maintenance of the engagement in the offenses. It was observed that substance use played a role in “sustaining the development of delinquent behaviors”

presented by some young people (Bright et al., 2017; Cauffman et al., 2024; Kim et al., 2019; Molero et al., 2015; Tolou-Shams et al., 2023; Walters et al., 2023). The adolescents presenting this type of trajectory -“more prolonged criminal careers” - were characterized by greater exposure to risk factors and more psychiatric problems (including substance-related). Substance use has also been shown to be related to higher odds of reoffending (Aebi et al., 2021; Cauffman et al., 2024; Craig et al., 2019; Drazdowski et al., 2015; Denney & Connor, 2016; Holloway et al., 2022; Tolou-Shams et al., 2023; Walters, 2018; Weber & Lynch, 2021).

Discussion

This integrative literature review aimed to obtain, integrate and evaluate empirical research results available in the recent literature, based on longitudinal studies, about the relationships between substance use and delinquency. Regarding the first hypothesis, it was possible to observe a high affinity between both behaviors. In some studies, the “crime-drug relationship” emerged as more significant than any other relationship analyzes with the additional variables (Brook et al., 2015; Craig et al., 2019; Denney & Connor, 2016; Kim et al., 2019; Weber & Lynch, 2021). Consistent with previous literature, it is evident that there is no single explanatory model for the connection between these behaviors, given their complex and multidetermined nature, as well as the potential for changes in how they are expressed and interrelated over time and across different contexts (Walters, 2018). This is how the bidirectional model seems to be more interesting, as it embraces reciprocal influences between conducts (White, 2015, 2018), in a non-deterministic way.

Moreover, in response to the second hypothesis, the data also revealed distinct roles played by both behaviors in processes intrinsic to their developmental trajectories, such as acceleration. A clear positive covariation between the behaviors was observed, as well as patterns in terms of frequency and aggravation (White, 2015). Changes observed in the trajectory of one behavior—such as

acceleration—were associated with similar changes in the trajectory of the other, as previously documented in the literature (Le Blanc, 2009; White, 2015, 2018).

Regarding the third hypothesis, most studies identified trajectories in which offending behavior preceded substance use, especially among males. These findings are consistent with the broader scientific literature, which indicates that delinquency tends to emerge before substance use (White, 2015). One possible explanation for the trajectories in which both behaviors emerge lies in the distinct escalation periods typically observed for each. For most individuals, the escalation of offending behavior tends to precede the escalation of substance use. Therefore, from early to mid-adolescence, the emergence of both behaviors would not necessarily imply a relationship that leads to a general deviation (Guo et al., 2023; Turner et al., 2020). One possible explanation is that substance use, at this stage, can be an occasional/episodic behavior and still normative at this point. The escalation in substance use, if present, tends to be only in late adolescence or early adulthood when such conduct - as a problem - presents its peak. In contrast, delinquency that begins in the first stage of adolescence (sometimes, even before), denotes precocity. This tends to lead to stability (related to the so-called persistent trajectories) (Turner et al., 2018). Thus, the premature emergence of offending behaviors is already indicative of a behavioral problem in development, which creates the conditions for the emergence of substance use in a problematic way.

However, it is important to note that the results of the studies also depend on the sample characteristics. In one of the studies (Turner et al., 2018), the authors assessed both behaviors of school adolescents from seventh to ninth grade (encompassing young people aged from 13 to 16 years, approximately). It is a period when delinquency aggravates, as commonly indicated by the literature, but not due to substance use, considering the general population (Moffitt, 2018). Another study (Molero et al., 2015), that evaluated young people of the same nationality, but into a wider

age range, identified that a part of the sample already presented SUD at the age of 15, and also presented higher rates of offending, when compared to the general population. Thus, the heterogeneity of offending and substance use trajectories found in different studies, in the society, can be inferred according to the level of exposure to risk and protective factors (Basto-Pereira & Farrington, 2022; Nawi et al., 2021).

Even though, in general, research results have indicated that the offending behavior has more often preceded the substance use, it is essential to be aware of the fact that the emergence of the delinquency did not necessarily cause substance use or preceded it in an exclusive way. In all studies, for a part of the sample of young people, substance use preceded the offending behaviors, as well as both conducts starting simultaneously, although the analysis of relationships and correlations have not been significant in these instances. One study (Bright et al., 2017) identified a subgroup of adolescents who presented substance use and offenses simultaneously, at study baseline. The proportion of adolescents composing this group, specifically, compared to those who composed the other identified groups - the “low risk to present both behaviors” and the “previous emergence of delinquency” - was much lower. Also, in another study, it was verified the situation in which the use of illicit substances preceded involvement in offenses, including considering different classes (violent and non-violent delinquency) (Walters, 2018).

The fourth hypothesis focused on the processes of maintenance and desistance, with an emphasis on the role of substance use in sustaining offending behavior. Substance use seemed to play a more significant role, maintaining offending behavior, or promoting a type of delay of desistance (a process that refers to the decline in frequency of committing offenses). It is assumed that substance use decreases the probabilities of young people engaging in conventional activities, which are characteristic of adulthood, such as work/employment, marriage/maintenance of a household, and increases the chances of exposure to risk factors, such as contact with the crime market and

incarceration/institutionalization, as well as developmental gaps, such as impairment in the development of self-control (Basto-Pereira & Farrington, 2022; Green et al., 2019; Le Blanc, 2009; Liu et al., 2021; Moffitt, 2018; White, 2015). For instance, in one study (Bright et al., 2017), it was observed that participants who were in the 'delinquency and substance use concurrent subgroup' were less likely to transition into the 'low risk for the emergence of both behaviors' class, when compared to those in the 'delinquency only subgroup'. In another study (Molero et al., 2015), authors identified that individuals who presented criteria for SUD presented higher rates of offending and a large proportion of them were still engaged in offenses at age 33, probably because of substance abuse.

It was also possible to observe differences in substance use and offending conduct according to gender. The results found are in line with the previous literature, which indicate that male adolescents are more likely to have previously engagement in offenses, as well as presenting higher rates of frequency and severity for both conducts (Herrera & Boxer, 2019; Liu et al., 2021; Moffitt, 2018; Guo et al., 2023; Roberts et al., 2023; Turner et al., 2020). For the female, the probability of the previous emergence of one of the two behaviors is similar. An interesting fact regarding the female gender concerns the evidence in the literature showing that the processes of deceleration and desistance in the offending behavior are easier (Slotboom et al., 2022). Females would be also more susceptible to present greater stability of offending behavior when it is followed by substance use at more problematic levels. Despite it once again highlights the role played by psychoactive substances in the maintenance of criminal conduct (Kim et al., 2019), it is important consider that females, more than males, are more susceptible to stigmatization and isolation, which in turn can contribute to their vulnerability, aggravating the impact of risk factors and making it more difficult for them to seek or receive help (Tolou-Shams et al., 2023), and increasing their exposure to victimization, which is responsible for numerous negative outcomes (Guo et al., 2023; Turner et al., 2020).

Although the results are in line with some previous findings in the literature, it is worth noting that the results are not consistent for all young people, which highlights the importance of the singularities and personal experiences (Nawi et al., 2021). This is also in line with what some authors propose regarding the complexity of this relationship between behaviors, preventing the adoption of a simplistic and linear thought process, of a deterministic nature, to explain and understand this phenomenon, in general (Denney & Connor, 2016; White, 2015, 2018). In addition, new models, proposing new associations between crime and drugs, can lead to improvements in this area of study.

Future research may explore more comprehensively the behavioral processes involved in the interaction between delinquency and substance use, as well as the influence of contextual and environmental variables on these behaviors during adolescence. In addition, it is relevant to investigate the perceptions of individuals who exhibit both behaviors, as well as those who present only one of them, which may contribute to a more functional and subjective understanding of such conduct. Qualitative methodologies, such as case studies and multiple case studies, may represent a promising starting point for this type of investigation. Some of the reviewed studies identified behavioral trajectories in which one of the conducts appeared in a problematic pattern, while the other did not. In this sense, future research could focus on identifying protective variables that prevent the co-occurrence and intensification of these behaviors, as well as on understanding how these patterns and variables differ by gender — a factor that proved to be relevant to understanding the “crime–drug relationship”. Finally, further studies could examine the biopsychosocial factors involved in the desistance processes of such behaviors, especially in cases where adolescents initially presented problematic levels of both conducts but demonstrated reduction or cessation in at least one of them.

Conclusions

The results of the present review added information and corroborated most of the

findings in the previous literature. Delinquency and substance use are behaviors that often emerge during adolescence, at which point they may begin to show a high degree of affinity and mutual influence in terms of onset, escalation, and maintenance. These are multiple and complex relationships, which reinforces the relevance of non-deterministic and reciprocal models, rather than unidirectional causal explanations. The findings indicate that delinquency tends to emerge before substance use, particularly among male adolescents, thus highlighting the importance of the gender variable in understanding these interactions. Substance use, in turn, appears to play a maintaining role in delinquent behavior in cases where both behaviors co-occur.

Nevertheless, some limitations should be underlined. The search terms used were limited, which may have resulted in the exclusion of other relevant studies. New reviews may expand the combination of search terms, incorporating additional synonyms such as “substance abuse”, “drug use”, “adolescent”, “offenses”, and “drug abuse”. They may also include new databases, consider a broader range of published articles, and cover publications in other languages. The limited number of studies found in the Web of Science database — and the absence of selected studies — may be attributed to the limitations of the search terms used. Moreover, given that it is a multidisciplinary database, it could be hypothesized that more robust studies, such as those employing longitudinal designs, may be published in journals associated with more consolidated disciplines. In addition, data collection, selection, and systematization were carried out by a single researcher, and analyses did not assess the risk of bias of the selected studies. Although this study followed some of the PRISMA criteria, not all of them were applied. New reviews can address these criteria and perform quantitative analysis, based on systematic methodologies.

Despite these limitations, this study used well-defined and presented processes and choices, which are replicable. It also used data stemming only from studies with longitudinal designs, published in journals indexed in the

main databases, which certainly contributes to the reliability of the assessments that, in turn, also meet previous literature findings. It assessed data concerning different segments of populations, including data from the general population, and different profiles of adolescent offenders and/or substance users. Also, it assessed studies that used different ways of measuring the two conducts in focus, namely: official and self-reported data, which, when added together, may contribute to a better understanding of the phenomena studied. Moreover, it was possible to identify that numerous authors indicate as necessary carrying out more complex studies regarding the personal and contextual variables of young people for whom the “crime-drug relationship” exists.

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