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Review

Social Jeopardy of Substance Use among Adolescents: A Review to Recognize the Common Risk and Protective Factors at the Global Level

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Abstract: Adolescence is a phase of life between childhood and adulthood marked by rapid biological, social and psychological changes. During this phase, individuals bear a more emotional and curious mind and may engage in risky behaviours. Decades of investigations have revealed that substance use usually begins in adolescence. The main essence of this paper is to carry out an elaborative review of earlier works to recognize familiar risks and protective factors for substance use among adolescents at the global level. Additional emphasis was given to identifying the various statistical modelling approaches, widely used in earlier studies, to promote research methodological issues for future research in this specific domain. Articles published from 1991 to 2021 on adolescent substance use were downloaded, and after carrying out a preliminary full-text review, 50 articles were selected keeping the priority of the aforementioned objectives. After an intensive review, risk factors were identified and clustered around five broad domains such as individual, parental, familial, peer and environmental factors. Protective factors were also categorized under the headings of five broad domains viz. individual, parental, familial, social and interventional. Specific statistical modelling techniques were identified to evaluate the relative risk of specific groups of adolescents being in the clutches of substance use. It is necessary to recognise the potential risk and protective factors and their combined effect on substance use among adolescents to prevent this menace from society. For a better understanding of research about the exact vulnerable age of onset of substance use during the adolescence period, both the orthogonally placed risk and protective factors necessarily need to be distinguished with an attempt to protect adolescents from the further abuse of substances, as recognised by parents and society. To prevent substance use, interventions such as regulating substance price & accessibility, school intervention programs, academic monitoring, social support, clear expectations between parents and child, addressing family trauma, awareness activities, healthy lifestyle habits, mental health support, family health counselling and substance abuse treatment should be implemented.

Keywords: adolescent; substances use; review; risk and protective factors; statistical modelling

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1. Introduction

The word adolescence comes from the Latin word *adolescere*, which means "to grow up" [1]. Adolescence is the transition phase of life between childhood and adulthood. Adolescents comprise a demographic bulge and approximately a quarter of the world's population constitutes adolescents [2,3]. According to the World Health Organization (WHO), the age of adolescence stretches between 10–20 years. However, the age of adolescence differs across time, countries, cultures and contexts. Adolescence is a life phase where people experience rapid cognitive, physical and psychological development, social transition and emotional changes, and the effort of individuals in this age group lies in increasing autonomy. All these changes can put adolescents in situations where they are more likely to be engaging in risky behaviour. In this juncture of a sensitive period of

life, the shape of developing future trajectories is accompanied with a high-risk period of onset of a variety of mental and maladaptive behaviours, such as depression, violence, delinquency and substance use [4]. Nowadays, adolescent health has become a major issue on the global agenda for policymakers and researchers.

Substances use generally includes the use of alcohol, tobacco, marijuana and illicit drugs. Substances use has phenomenally increased in recent times and affects the entire world. Globally, substance use is very prevalent among adolescents and adult populations in developed and developing countries. Substance use is also one of the major contributors to disability-adjusted life years (DALYs) [5]. It deteriorates the physical and mental health of the users. The World Health Organization revealed that in 2016, drug and alcohol use disorders were associated with 160,235 and 145,565 deaths, respectively [6]. It also diminishes the working ability, productivity and success rate at work. Smoking cigarettes constitutes a significant burden on society because of its association with high rates of mortality and morbidity. Substance use leads to poor executive functioning, risky sexual behaviour, unusual beliefs, social isolation, depression, alleviating tension difficulties transitioning into adult social roles and disorganised thinking [7,8].

Adolescence is a sensitive period in which individuals tend to look for autonomy from parents and are more likely to engage in unprecedented behaviours in various aspects of life. Substance use is one of the prime health threats for adolescents in many developed and developing countries and it is indeed a significant predictor of future drug addiction and dependence. Adolescent substance use has prompted a magnitude of social disorders, which affect both individual and public health [9]. Alcohol is the most commonly used substance during adolescence. According to Centres for Disease Control and Prevention (CDC), approximately 30% of high school students drink their first alcohol before age 13 and rates of alcohol consumption gradually increase as their age increases. Marijuana is an important drug in the transition from licit to illicit drugs [10]. Marijuana is the most widely used illicit drug among adolescence. A recent study has revealed that tobacco use in early adolescence period elevates the risk of tobacco dependence in adulthood, and its coexistence with alcohol use disorder detrimentally affects mental health [11]. Recently, e-cigarettes have also been used worldwide. An e-cigarette is a nicotine delivery device that mimics the experience of smoking without tobacco or other harmful chemicals. Substantial literature indicates that adolescence is concerned with a higher risk of substance use and its adverse impacts on an individual's health and society [12]. Substances use also increases the likelihood of spreading HIV/AIDS, unemployment, vehicular fatalities and juvenile delinquency among adolescents [13]. Substance use is also linked with lower academic functioning, poor cognitive functioning, early initiation of sexual intercourse, increase misbehaviour, conflict in relationships, as well as a tendency for a decline in rational thinking and deterioration of physical health.

Adult substance use has received considerable attention, but in the last few decades, adolescent substance use has received special attention from policymakers and governments due to its gloomy and adverse consequences on the physical and mental health of an individual. The need for attention became evident as substance use patterns among adolescents increased. The adoption of appropriate prevention and intervention programmes for substance use among adolescents is one of the chief priorities of policymakers. Despite several efforts by policymakers to restrain the practice of substance use among adolescents, the trend of substance use is still prevailing. Adolescents are emotionally vulnerable and curious in their minds. Adolescents across the world should be monitored carefully because it is the juncture period of childhood and adulthood. The racial, ethnic, socio-economic and socio-cultural settings of individuals vary considerably over space and time. Therefore, the broad relevance of this review is to recognise the most common stimulus risk factors and the protective factors as resistance to substance use among adolescents. The statistical modelling used in earlier literatures has been highlighted to show the significant result of the analysis. The use of statistical modelling signifies the relevant cause-and-effect analysis of substance use among adolescents. So far, a vast number of articles have been published

on adolescent substance use. However, the earlier reviews did not precisely identify the risk and protective factors of substance use among adolescents considering the importance and appropriate use of statistical modelling approaches applied in earlier research. Risk factors promote the escalation and initiation of substance use whereas protective factors may play as an interventional role in reducing exposure to substance use among adolescents. To develop effective interventions, it is necessary to pertain a better understanding of the potential risks and protective factors of adolescent substance use. Proper diagnosis of exploring and recognising the familiar risk and protective factors, keeping the importance on the various social issues, using appropriate statistical modelling has evolved. It has been revealed that studies published during the first half of the 1990s predominantly employed groups variability tests viz. *t*-test, ANOVA and the simple bivariate correlation to get an idea of the strength of the relationship [14]. It is necessary to acknowledge statistical modelling approaches to figure out the important risk and protective factors.

Overall, the main essence of this organised review is to identify the most pertinent risk and protective factors of adolescent substance use by taking into consideration statistical modelling approaches.

2. Methods

In the present investigation, a comprehensive and thorough search of electronic databases, such as PubMed, Google Scholar, Web of Science, and Scopus, was undertaken to procure relevant research articles about adolescent substance use. The search was conducted using the comprehensive keyword "adolescent substances use", and the data was collected from 30 years spanning between 1991 to 2021. Subsequently, a randomised retrieval and download of a total of 200 articles were carried out, and a full-text review was conducted to ascertain the relevance of these articles to the study's scope. The inclusion criteria for this review stipulated that only peer-reviewed research articles written in the English language and organised logically and coherently were considered. However, after a rigorous evaluation of these articles, it was confirmed that 100 of them did not adequately address the critical factors of risk and protection associated with adolescent substance use. Additionally, 50 articles were excluded from the study due to their inadequate application of statistical analysis. Eventually, a total of 50 articles that fulfilled all the inclusion criteria and objectives of this study were selected for review. The primary focus of this review was to identify articles that confirm the key risk and protective factors associated with adolescent substance use, specifically, tobacco, alcohol, marijuana and illicit drugs. Statistical modelling approaches, ranging from descriptive to inferential statistics, were utilised to assess the data obtained from the selected articles. All basic information related to the research articles was meticulously recorded in Microsoft Excel spreadsheets. Figure 1 displays the year-wise publications of selected articles. Figure 2 shows the inclusion and exclusion criteria of the article selection. Studies that were selected for this study, were conducted in the United States of America, United Kingdom, Iceland, Sweden, Spain, Portugal, Slovenia, the Czech Republic, Virginia, Hungary, Sweden, Switzerland, Newcastle upon Tyne, Dublin, Rome, Bremen and Groningen, Australia, South Africa, Nigeria, Arizona and Canada.

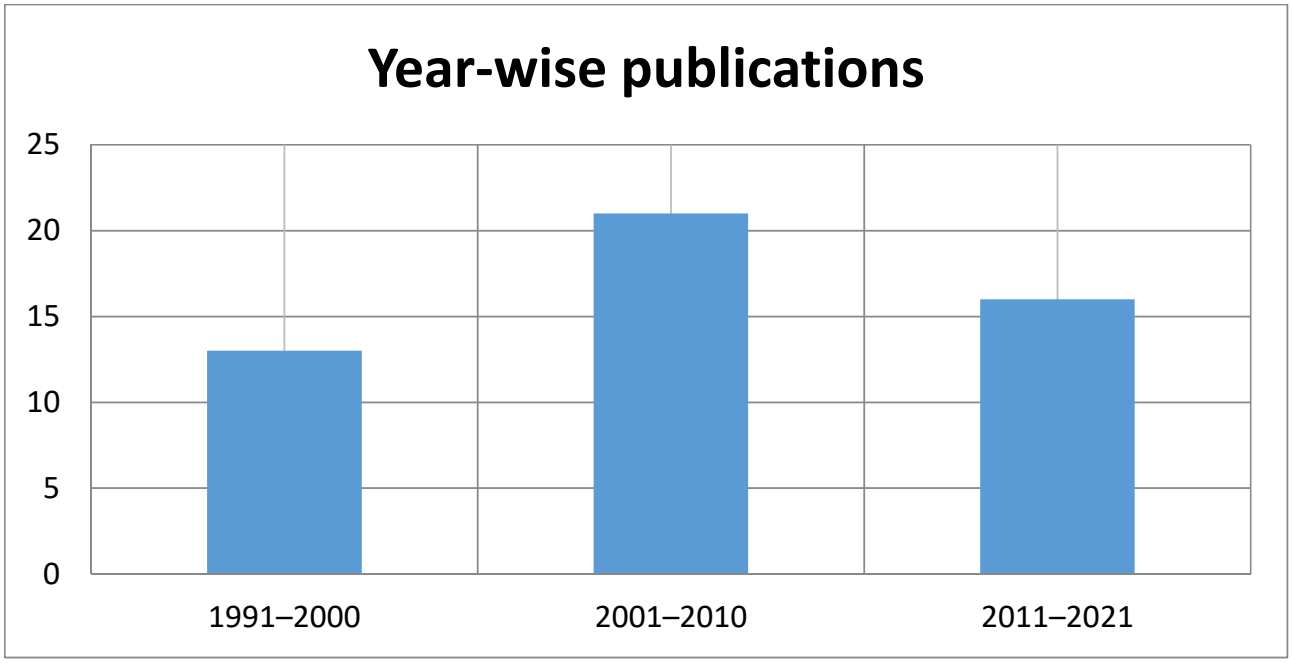

Figure 1. Year-wise publications of selected articles.

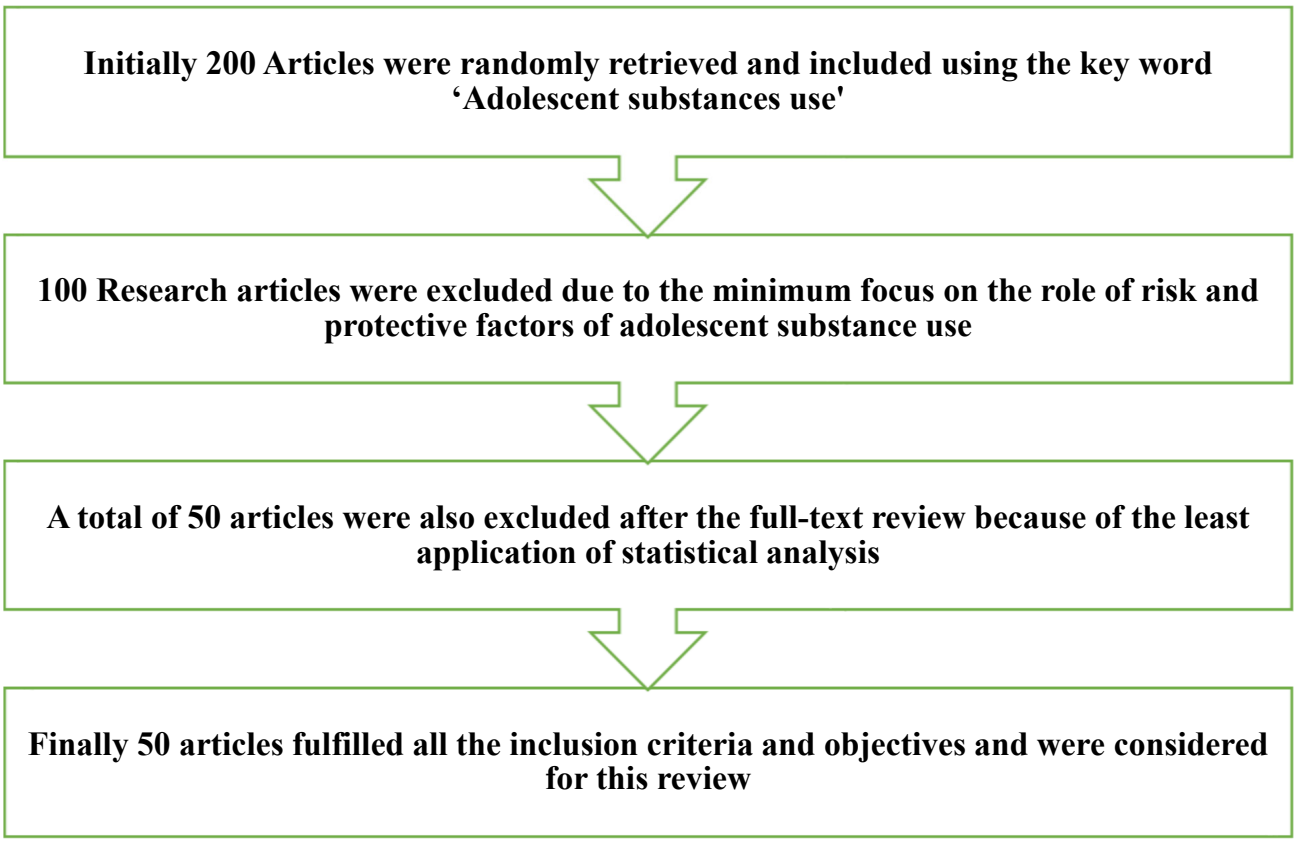

Figure 2. Inclusion and exclusion criteria of articles selection.

3. Results

3.1. Overview of the Selected Articles

In this study, a total of fifty articles conformed to the inclusion criteria and were taken into consideration. Table 1 shows the overview of the selected research articles, such as the

sample size, year of publication, age/grade of the participants, purpose and methodologies. It was found that the sample size differs considerably in selected studies. The sample size of the adolescents in the studies ranges from 54 to 67,870. It was also found that the age and grade of adolescence varied across different studies. The age of the adolescent was varied from 10–21 years in studies, while some of the studies stated that the school grades of the adolescents varied from sixth to twelve. It was also revealed that studies varied in terms of substance use measures. Most researchers have only studied alcohol, cigarette and marijuana as widely used substances, while only a limited number of studies included illicit drugs. After carrying out an extensive review, it has been revealed that various research articles incorporate various statistical modelling approaches to fulfil their specific objective. Earlier research studies were engaged in the application of various forms of univariate, bivariate and multivariate statistical techniques to fulfil specific objectives. Descriptive statistics and summarisation of data are used to provide a brief description of the study participants data, while inferential statistical techniques are employed to draw inferences about the population. It was found that earlier research studies incorporated the most notable statistical techniques, such as the *t*-test, ANOVA, ANCOVA, MANOVA, advanced regression, structural equation modelling and factor analysis, to achieve their objective.

Table 1. Overview of the selected articles.

References	Year of Publication	Purpose of the Study	Sample Size	Age/Grade of the Participants	Substances	Statistical Techniques Applied
[15]	1991	To examine the social influence process on adolescent substance use	526	Seventh graders	Alcohol and cigarette	Hierarchical regression analysis
[16]	1992	To assess the vulnerable and protective factors of substance use	1289	11–13 years	Cigarette, alcohol, and marijuana	Multiple regression
[17]	1993	To investigate the role of parental monitoring and parental alcoholism on adolescent substance use	454	10.5 to 15.5 years	Alcohol and drugs	Structural equation modelling
[18]	1994	To assess the impact of the interpersonal and intrapersonal risk on predicting adolescent substance use	1170	Sixth and seventh graders	Tobacco, alcohol, marijuana, and other illicit drug	ANOVA, Pearson correlation, hierarchical regression analysis
[19]	1996	To examine longitudinal adolescence substance use	763	11–15 years	Alcohol, cigarettes, and marijuana	Latent growth models
[20]	1997	To investigate the role of peer pressure on mediating the effect of the differential association of adolescent substance use	1543	NA	Alcohol and marijuana	Structural equation modelling
[21]	1997	To investigate the role of social context on adolescent substances use	664	14–17 years	Alcohol, cigarette, and marijuana use,	latent growth curve methodology
[22]	1999	To assess the role of age, social bonding and social learning on adolescent substance use	3065	Seventh-twelve grades	marijuana	Correlations, regression
[23]	1999	Identification of individual risk factors that influence initiation and escalation of substance use	NA	NA	NA	NA
[24]	1999	To examine the role of parental, peer, school and neighbourhood contexts in understanding adolescent substances use	283	13–18 years	Cigarettes, alcohol, marijuana and illicit drugs	Hierarchical Regression, correlation,
[25]	2000	To explore the role of peers and parents on adolescent substance use	443	Seventh grade	Cigarettes, alcohol and marijuana	Structural equation modelling

Table 1. *Cont.*

References	Year of Publication	Purpose of the Study	Sample Size	Age/Grade of the Participants	Substances	Statistical Techniques Applied
[26]	2000	To identify potential protective factors against involvement with additional illicit drugs among adolescence who used marijuana	9268	15–20 years	Marijuana and other illicit drugs	Correlation, exploratory factor analysis, logistic regression
[9]	2000	To examine family-based risk and protective factors on adolescent substance use	5009	12–17 years	Tobacco, alcohol and marijuana	ANOVA, chi-square and *t*-test
[27]	2001	To investigate the relationship between risky sexual behaviour and adolescent substance use	166	15–21 years	Alcohol and illicit drugs	Chi-square test of association, ANOVA, MANOVA group variability test and regression analysis
[28]	2001	To investigate the moderation effects in the relation of family risk factors on adolescent substance use	1810	11–14 years	tobacco, alcohol, and marijuana	Correlations, Latent growth model
[29]	2001	To explore the association between various societal issues during adolescence and their substance use	4516	11–16 years	Cigarette, alcohol and illicit drug	Logistic regression
[30]	2002	To investigate the relationship between family structure, family functioning with adolescent substance use	3984	14–15 years	Alcohol and illicit drug	Chi-square, logistic regression
[31]	2002	To study the interventions effect as preventive to early substance use	672	Sixth-ninth grade	Tobacco and alcohol	Logistic regression
[32]	2003	To examine the link between academic experiences, attitudes and perceptions with adolescent substance use	1897	14–20 years	Alcohol, cigarettes, and marijuana	Hierarchical linear modelling
[33]	2003	To examine if urban adolescents are more likely than suburban or rural youth to engage in risky behaviours.	15,349	Ninth-twelve grade	Alcohol and other illicit drug	Chi-square and logistic regression

Table 1. *Cont.*

References	Year of Publication	Purpose of the Study	Sample Size	Age/Grade of the Participants	Substances	Statistical Techniques Applied
[34]	2003	To compare the prevalence of adolescence substance use from Australian and U.S surveys	1192, 12,654 and 4538	14–17 years	Alcohol, cigarettes and marijuana	Prevalence estimates through summary statistics
[35]	2004	To examine the effects of peer and parent support on adolescent substance use	1826	Seventh-ninth graders	Cigarette, alcohol, and marijuana	Structural equation modelling, correlation
[36]	2005	To investigates the association between family structure and moderating effects of peers on adolescent substance use	54,238	Middle and high school students	Tobacco, alcohol, marijuana, and other illicit drug	Scheffe's Test, Logistic regression
[37]	2006	To investigate the existence and severity of peer influences in adolescent substance use	3027	12–18 years	Alcohol, smoking and illicit drug use	Regression, F-test
[38]	2007	To identify risk and protective factors for adolescent substance use	17,215	12–20 years	Alcohol, marijuana, tobacco and five other drugs	Logistic regressions, hierarchical linear regression
[39]	2007	To investigates the impact of an after-school programme in urban areas in preventing adolescent substance use.	304	High school youth	Alcohol, cigarettes and marijuana	Hierarchical linear modelling
[40]	2009	To explore the role of TV viewing during family meals on adolescent substance use	806	NA	Cigarettes, alcohol and marijuana	General linear modelling
[41]	2009	To examine socio-economic differences on adolescent substance, use and the mediating role of parents' knowledge and peer substances use	8795	Sixth-tenth grade	Alcohol, cigarettes and marijuana	Multiple indicators, multiple cause model, structural equation modelling
[42]	2009	To investigate the role of cumulative and moderating effects of neighbourhood context on adolescence substance use	2006	NA	Alcohol and marijuana	Hierarchical linear modelling
[43]	2009	To investigate the family and school-level factors of adolescent substance use	48,641	Sixth–twelve grades	Alcohol, cigarettes and marijuana	Hierarchical logistic regression

Table 1. *Cont.*

References	Year of Publication	Purpose of the Study	Sample Size	Age/Grade of the Participants	Substances	Statistical Techniques Applied
[44]	2010	To examine relationships between conduct problems and close friends' substance use, with adolescents' substance use	1237	11–18 years	Alcohol, tobacco and marijuana	Logistic regression
[45]	2010	To compare the impact of parental and peer pressure on adolescent substance use	3188	Junior high school students	Alcohol and tobacco	Binomial regression,
[46]	2010	To assess the protective factors of adolescent substance use	881	14–20 years	Alcohol, cigarettes and marijuana	Multiple regression, Chi-square tests
[47]	2010	To study the differences in adolescent substance use by race and ethnicity	5500	Seventh and eighth graders	Alcohol, cigarettes and marijuana	Generalised estimating equations, path analysis models
[48]	2011	To investigate the key role of the selection of new friends on adolescent substance use	151	Eight-ninth graders	Alcohol, cigarettes and marijuana	Cross-lag panel analysis
[49]	2011	To examine the influence of friends and parents on adolescent substance use	166	Tenth grade	Alcohol, tobacco and marijuana and other illicit drugs	Correlations, regression
[50]	2011	To investigate the risk and protective factor and their influence on adolescents' substance use	3876	Seventh-ninth grades	Alcohol, tobacco, and cannabis	Independent *t*-tests, logistic regression
[51]	2012	To examine religiosity and its association with adolescent substance use	67,870	12–17 years	Tobacco, alcohol, prescription drug, marijuana, and other illicit drugs	Logistic regression
[52]	2012	To investigate social and geographic factors of adolescent substance use	254	13–20 years	Alcohol and drug	Regression
[53]	2013	To examine the relationship between peer perception of substances use and adolescents' substance use	17,865	12–17 years	Alcohol, cigarettes and marijuana	Pearson product-moment correlation, Logistic regression

Table 1. *Cont.*

References	Year of Publication	Purpose of the Study	Sample Size	Age/Grade of the Participants	Substances	Statistical Techniques Applied
[54]	2013	To test differential effects of parental controls on adolescent substance use	7349	Tenth grade students	Tobacco, cigarettes, alcohol, inhalants, and marijuana	Regression mixture models
[55]	2014	This study examines the role of different parenting styles as a protective factor against substance use	7718	11–19 years	Alcohol, cigarettes, marijuana, and other illegal drugs	F tests, Multifactorial MANOVA
[56]	2014	To examine social norms and their association with substance use	2248	Fifth-ninth grade	Alcohol, tobacco and marijuana	Multilevel logistic regression, Correlations and *t*-tests
[57]	2015	To investigate the relationship between adolescence out of school time and substance use	766	15 years and end of high School	Marijuana, alcohol, and Cigarettes	Correlation, binary and multinomial logistic regression
[58]	2016	To examine the impact of parenting style on adolescent substance use	1268	12–13 years	Cigarette, alcohol and illicit drugs	Principal component analysis, logistic regression
[59]	2017	To identify risk and protective factors of adolescent substance use	600	10–19 years	Alcohol, tobacco, cannabis and illicit drugs	Binary logistic regression
[60]	2018	To test the impact of family, peer and school relationships on substance use	9055	11–16 years	Tobacco, cannabis and alcohol	Multilevel logistic regression
[61]	2018	To explore the family management risk and protective factors on substance use	54	14–20 years	Alcohol and other illicit drugs	Ordinal logistic regressions
[62]	2020	To assess the relationship between multidimensional self-esteem and personal indicator with substance use	644	12–17 years	Cigarettes, alcohol, marijuana, and other illicit drugs	Confirmatory factor analysis, MANOVA, ANCOVA, ANOVA
[63]	2021	To investigate the impact of the COVID-19 pandemic on mental health and substance use	59,701	13–18	Alcohol Cigarette and e-cigarette	Linear mixed-effects, logistic mixed-effects

3.2. Risk Factors as a Stimulus to Substance Use

Several risk factors contribute to the onset and escalation of substance use among adolescents. After a thorough review, a few risk factors have been identified as instrumental in directly and indirectly elevating the risk of substance use. Recognised risk factors are categorised into different broad domains. Those are individual, parental, familial, environmental and peer factors. An individual-level risk factor is a characteristic of an individual that increases their likelihood of developing certain health conditions or experiencing negative outcomes, such as substance use. Among the individual-level factors, negative life events, adolescent delinquency, lower academic level, school misbehaviour, school disengagement, high-risk sexual behaviour, depression, dysregulated aggression and paid employment may elevate the risk of substance use [32]. Parental risk factors are characteristics or behaviour of parents that increase the likelihood of substance use for adolescents. During the adolescence period, both the parents and adolescents face new challenges and responsibilities in their relationship. Any kind of apathy and indifference from the parents end in nourishing may trigger the habit of substance use among adolescents. Hence, several distinct parental factors are identified after an extensive literature review. Parental substance use is one of the risk factors for adolescent substance use [17]. Lower parental monitoring, authoritarian parenting style, lower levels of maternal support for their child, neglectful parenting style and higher parent–child conflict are strongly associated with adolescent substance use [19,21]. Familial risk factors refer to factors that are related to a person's family or home and increase the likelihood of adolescent substance use. Adolescents who did not grow up with biological parents and adolescents who lived in single-parent families were more likely to use substances. During adolescence, adolescents want more liberty and autonomy from various family restrictions. Familial risk factors include poor family management, family conflict, exposure to domestic violence, negative family interactions and siblings' substance use. Peer-level risk factors are factors related to an individual's social interactions and relationships with peers that increase the likelihood of them using the substance. Generally, adolescents seek autonomy from their family to get the association with peer and under-peer individuals who are addicted to certain substance; automatically, the individual adolescents get attracted to substance use. Peer factors have exerted a robust impact on adolescent substance use. Peer encouragement and support for substance use, greater interaction with deviant and antisocial peers, peer substance use, peer influence and unsupervised duration in spending with peers have been identified as risk factors after a thorough review [18,21]. Environmental risk factors of substance use refer to factors related to an individual's social and cultural environment that increase the likelihood of them developing a substance use disorder. Environmental factors have a considerable impact on adolescents' behaviour. Environmental factors include the perceived availability of drugs, and neighbourhood disadvantage is also found as a risk factor for adolescent substance use [24].

3.3. Protective Factors as Resistance to Substance Use

Several factors were linked to lowering the risk of substance use, and these factors have been called protective factors. Protective factors may reduce the effect of risk factors. After a thorough literature review, various protective factors were found for adolescent substance use. As for risk factors, protective factors were also categorised into several domains. Individual-level protective factors refer to factors that can help protect an individual from the negative effects of substance use and reduce the likelihood of them engaging in substance use. Among individual variables, personal competence in various domains of life is found to be protective against adolescent substance use. Higher academic achievement increased academic and physical self-esteem, positive and friendly relationships with teachers, school interests and participation in sports are negatively associated with substance use [60,62]. Parental protective factors refer to factors related to parenting practices that promote positive child development and reduce the likelihood of adolescent substance use. Parental factors are also crucial in regulating adolescent substance use. Parental support,

high parental education, parents' interest in education, parental encouragement, parental control, parent-child attachment, indulgent parenting style, good communication with parents, lower parental substances use, staying with both parents, parental supervision and parental monitoring are recognised as the notable protective risk factors for adolescent substance use [26]. Familial protective factors refer to factors related to the family environment that promotes positive child development and reduces the likelihood of risky behaviour, such as substance use. Familial factors are very important for adolescent substance use. Family support is positively affecting adolescent substance use. Maintaining shared values in the family, having dinner with the family, a higher socio-economic status of the family, family bonding, involvement and intactness in the family seem to be protective against substance use [46]. Social protective factors for substance use refer to factors that promote positive outcomes and reduce the likelihood of individuals developing a substance use disorder. Social factors, such as religiosity and belief in God, were found to also be protective against substance use [9]. Intervention programs can be considered protective factors as they provide support, education and resources to individuals who are at risk of developing a particular condition or disorder. Intervention programmes were also associated with lower substance use. The Adolescent Transitions Program and positive youth development programme were found to be protective against adolescent substance use [31].

4. Discussion

In this study, an insight of global research on adolescent substance use was emphasised and will give a better future direction for researchers. The main objective of this review is to identify the most pertinent risk and protective factors of adolescent substance use by taking into consideration statistical modelling approaches. Adolescence is a peak period for the escalation and initiation of substance use. It is necessary to understand the common risk and protective factors of adolescent substance use to mitigate and prevent the consequences of substance use.

Risk factors are associated with an increased risk of substance use among adolescents. Understanding individual-level risk factors is important for identifying and addressing adolescent substance use as well as developing targeted intervention and prevention strategies. A negative life event is defined as experiences that are unexpected, stressful and spectacular, and can drastically transform one's social surroundings and increase their risk for engaging behaviour. Examples of negative life events include experiencing the death of a loved one, divorce or separation, financial difficulties, a serious illness or injury, or being a victim of abuse or violence. Negative life events make an adolescent more susceptible to substance use by accelerating life stress and helplessness. It was found in earlier studies that adolescents use substances sometimes to relieve the distress caused by negative life events [64]. To address the impact of negative life events as a risk factor, it is important to focus on prevention and early intervention. This may include providing support and resources to individuals who have experienced negative life events, such as counselling, social support and access to resources, such as financial assistance or medical care. Adolescents with dysregulation issues are typically impulsive and make poor decisions without thinking about the repercussions of their actions and tend to use more substances. High-risk sexual behaviour is also amplified by substance use among adolescents. Academic failure and low levels of academic achievement have also accelerated the risk of substance use among adolescents. Adolescents who struggle academically are more likely to associate with deviant peers and engage in substance use and other negative activities. One study found that academic failure was a major risk factor for adolescent drinking [65]. School disengagement is associated with substance use because once adolescents are disengaged from school, their affiliation with deviant peers will increase. One study revealed that attending a private school in a rural area seems to be risky for adolescents because of the prevalence of economic disparity in schools; thus, adolescents are inclined to low self-esteem and tend to use substances. Students who misbehave at school are more likely to be associated with substance use than those with a high academic achievement. Paid

employment for adolescents is linked with increased substance use because it will expose them to the adult-like situation, for which they are unsuited. Some studies revealed that each unit increase in age increases the likelihood of substance use because increasing age exposure to the substance impels them from the deviant peer. Several studies found that marijuana use is higher among older adolescents. Most depressed adolescents are at higher risk for substance use due to poor psychological functioning, and sometimes, it increases the feeling of hopelessness and loneliness. While sometimes, substance use can increase the depression level of the individual. Aggressive behaviour of adolescents is one of the key risk factors for substance use. Addressing individual-level risk factors requires a comprehensive approach that focuses on early intervention and prevention, such as education and awareness, screening and assessment, behavioural interventions, medication management, support service and community-based programmes. Parental substance use is also found to influence adolescent substance use. Lower parental monitoring and higher parent–child conflict raised the risk for substance use [66]. Lower parental monitoring increases the likelihood of adolescent delinquency and an increased association with substance use peers. Authoritarian parenting styles and neglectful parenting styles are related to higher substance use as it diminishes the self-esteem of the adolescent. A lower level of mother–adolescent support is associated with an increased level of depression and stress, which may increase adolescents' inclination with substance-use peers. Living in a single-parent family or not growing up with biological parents is associated with lower monitoring and support, thus, adolescents may be engaged in risky behaviour. To address parental risk factors of substance use, several approaches are required, such as parenting education, family counselling, substance abuse treatment, support service and child protective services. Family conflict increases stress and pressure and does not provide mental support; thus, adolescents may get attached to others who may influence substance use. Substance use in siblings is one of the risk factors for adolescent substance use as adolescents are typically close with their siblings and spend the most time with them because they grow up together; thus, their substance use is associated with adolescent substance use. Exposure to violence is linked with poor mental health and problematic behaviour, which may elevate the risk of substance use. Negative family interactions and poor family management are also tied to adolescent substance use. Adolescents who came from families with lower parental monitoring and high parent–child conflict were more prone to the use diverse substances [21]. Parental supervision and disciplinary techniques greatly influenced adolescent substance use [43]. There are several ways by which familial risk factors can minimise substance use: conduct a family health history assessment, encourage healthy lifestyle habits, address mental health concerns and develop a family health plan. Previous studies identified that peer and parental factors are differently associated with specific substance use; peers are associated with the onset of marijuana while parental factors influence the transition from marijuana to other illicit substance use [67–69]. Greater involvement with deviant and antisocial peers accelerates the substance use initiation among adolescents because deviant peers exacerbate the problematic behaviour of the adolescent and provide access to substances. It was found, in several studies, that having friends who use a substance is strongly linked with adolescent substance use [70]. A friend's substance use is one of the strongest risk factors because friends provide immediate access to substances and also shape positive attitudes towards substances. Peer influence, encouragement and pressure may increase a positive attitude towards substance use because they are convincing and make substances available for the adolescent, as well as encouraging them to take the risk. Some earlier studies found that females are more influenced by their peers as compared to males. Unsupervised time with peers increases the odds and amount of substance use among adolescents as it promotes adolescent deviance. Adolescents who use substances are more likely to select new friends with similar patterns of substance use. Selection of new friends is sometimes changing a substance use pattern because trying illicit substances for the first time requires information on where to buy substances and how to use these substances. Implementing strategies to address peer risk factors can help to prevent sub-

stance use and promote healthier behaviour among adolescents. A few potential ways are increasing awareness through appropriate materials and interactive activities, providing courage to foster positive peer relationships, providing an alternative to substance use and encouraging positive reinforcement. In some studies, parental factors found a stronger impact on adolescent substance use while some research found peer influence to be stronger. The prevalence of substance use is higher in areas where the perceived availability of substances is more because adolescents who resided in the vicinity to the said place can easily get the substance in accordance with their addiction. The concentrated disadvantages of living in a neighbourhood with increased poverty, crime and violence, are a large increase in adolescent substance use. Among urban adolescents, the use of illicit substances was found to have a higher rate due to their availability. Stringent footsteps and law enforcement efforts are required to reduce the availability and use of the substances in areas where substances are sold. To reduce substance use in neighbourhoods where poverty, crime and violence are high, several measures include the promotion of community development programmes, supporting individuals struggling with education, improving access to education and providing job training.

In addition to recognising risk factors for adolescent substance use, it is also very necessary to identify the protective factors, which can help to delay the onset and escalation of substance use among adolescents. Protective factors can also neutralise or minimise the adverse effects of risk factors. To combat adolescent substance use, it is necessary to develop and enhance the protective factors. Personal competencies, such as academic and adult competence, minimise the risk of substance use by developing a positive approach. Higher academic achievement is found to be more protective against adolescent substance use among school-related factors [62]. Studies have found that participation in sports appears to be protective for some types of substances. Physical and academic self-esteem build confidence among adolescents, which will minimise depression and stress among adolescents and also help to make good decisions in life, all of which minimise substance use. Positive and friendly relations with teachers help to develop better academic performance and social-emotional skills, all of which are associated with lower substance use. In order to effectively implement more individual-level protective factors of adolescent substance use, several strategies should be considered using evidence-based practices, addressing multiple risk factors, promoting self-efficacy, monitoring progress and evaluating effectiveness. Family support, such as parental emotional and instrumental support, enabled adolescents to more effectively deal with various life stressors. Family involvement is protective against substance use because it provides all the necessary resources and support for dealing with the pressure and stress in an adolescent's life. Adolescents who come from intact families were less likely to use substances. Shared values in the family will help the adolescent to adopt social behaviour. Family bonds are one of the protective factors for adolescent substance use [71]. Adolescents who had greater familial ties were less likely to associate with peers who use substances. Having a meal with family is associated with lower substance use because during dinner, parents can monitor and discuss social values. Higher socio-economic status is also protective against substance use because adolescents who belonged to higher socio-economic families get all the financial and mental support. Implementing familial-level protective factors requires more comprehensive approaches by addressing family trauma and strengthening family relationships. High parental education is found to be protective against substance use because it helps to cope with deprivation, poverty and economic stress in the family. Parental encouragement and interest in education create a positive environment and attitudes toward learning, which will minimise risky behaviour among adolescents. Lower parental substance use had a protective effect against adolescent substance use because if parents use substances, positive attitudes about substance use will develop among adolescents. Staying with both biological parents may help to pay attention to increase supervision, which will minimise the risky behaviours and attachment with deviant peers. The quality of the parent–adolescent relationship is strongly associated with adolescent substance use, the adolescent who maintains a good bond with

their parents usually have reduced substance use [72]. Parental support is found to be protective against adolescent substance use. Parental support increases the self-control ability of adolescents and minimises deviance-prone attitudes. Parental practices, such as supervision and monitoring, and well communication with adolescents, will make parents aware of adolescent behaviour within and outside the home and if the adolescent crosses certain limits, they will be able to reinforce good behaviour. The studies have revealed that the authoritative parenting style is protective while some deem it as risky. An indulgent parenting style is related to lower substance use as it is linked with higher self-esteem and academic achievement. Parental protective factors play a significant role in reducing adolescent substance use. Establishing clear expectations and rules regarding substance use, encouraging positive communication and providing emotional support can be more effective in restricting substance use. Religiosity and belief in God seem to be protective against adolescent substance use as it provides values in daily life. Socialisation with people who share religious beliefs also help to improve self-control and esteem and keep adolescents affiliated with conservative peers. Religious involvement can provide social support and can reduce the likelihood of substance use. Encouragement for positive social support and motivation for involvement in community activities can prevent substance use to a certain extent. The Adolescent Transitions Program is found to be protective against adolescent substance use because, in this programme, negative effects and coping strategies of substance use was discussed. The ATP is a multilevel family intervention that takes place in middle Scholl settings. The positive youth development programme emphasises the promotion of positive outcomes for the adolescent, such as preventing substance use and promoting wellbeing. Studies have found PYD to be protective against substance use because adolescents who participate in the programme view substances as harmful and the incidence of substance use is decreasing.

After a rigorous review, it was found that studies incorporate various methodologies to obtain their objective. It was observed that correlation is applied in several studies to examine the strength of association among variables of interest. Among all the correlation methods, the Pearson method is the most widely used in those studies. It was found that for testing the hypothesis, both the parametric and non-parametric tests were employed. The duo group mean variability *t*-test was applied in the case of a small sample size to compare the mean difference across two groups. The Chi-square test was used widely in these studies to examine the association between two categorical variables and the p-value indicates the probability of the difference between observed and expected frequencies. The F test is applied to compare the variance for two independent samples and also incorporate in the ANOVA to examine the significance of more than two sample means. For ANOVA and ANCOVA, both techniques are used to compare means across various groups. Analysis of variance was found to be the most widely used statistical technique for hypothesis testing [73]. ANOVA is suitable to use when all the independent variables are categorical while ANCOVA is suitable when the dependent variables are both continuous and categorical. ANOVA was employed to examine the difference in adolescent substance use across different groups. ANCOVA was carried out in a study to compare differences in self-esteem, psychological maladjustment, behaviour problems and parenting dimension with substance users and non-users by including sex and age as covariant variables. It was found that one study used factorial MANOVA to compare substance use with parenting style. Multiple regression is one of the oldest statistical techniques used to estimate the relationship between one outcome variable and more than one independent variable that have a causation relation [74]. It was found that studies used multiple regression to predict the effect of risk and protective factors on adolescent substance use. Logistic regression is an extension of the multiple regression method, and it is employed when the dependent variable is measured as a dichotomous variable. Logistic regression helps to interpret the parameters very simply in terms of the odds ratio [75]. The findings revealed that binary logistic regression was used in most of the studies to assess the effect and the relationship of different protective and risk factors on adolescent substance use. Logistic regression

is employed when the substance use outcome is measured as a dichotomising variable, whether the respondent is using any substances or is not at a given point in time. The logistic mixed effect was also used in a study. Multinomial regression is applied when the outcome variable has more than two categories. Multinomial regression is used in a study where adolescents responded to how often they used substances in the past 30, and their responses have more than two categories. Ordinal regression was also run in a study to determine the impact of family management and demographic and socio-economic variables on adolescent substance use [61]. In this study, the frequency and intensity of the substance were measured through an ordinal scale. Negative binomial regressions have been used in a study to examine the influence of peers and parents on adolescents' substance use. In this study, adolescent substance use was measured as a count variable, as count variables violated the OLS assumption; therefore, negative binomial regressions were employed [45]. Hierarchical linear regression is applied when the analysis is conducted across different levels or more than one unit of analysis. It is associated with nested data and is used in several studies to test the hypothesis; it regressed intrapersonal and interpersonal domains and their predictive association with adolescent substance use. A study conducted in the United States used the HLM model and in level 1, intra-individual change factors, and level 2, the between-group factors, were taken whereas another study considered individual-level factors as a level 1 and peer factors as a level 2 [32,38]. One study examined the role of a positive youth development programme on the prevention of adolescent substance use where respondents were considered as level 1and received intervention taken at level 2 [39]. Cross-lag panel analysis was employed in a study to test the hypothesis and also examine the predictive and cross-sectional association between adolescent substance use and peer substance use [48]. Structural equation modelling was employed in a study to analyse the impact of parental substance use on adolescent substance use through the mediating effect of parental monitoring and adolescent temperament [17]. It was found that studies have employed the measurement model firstly for specifying latent constructs (unobserved factor), and secondly, studies employed the measurement model in the structural model in which the influence of unobserved variables is examined. The measurement model is employed by using factor analysis where the structural model is estimated through path analysis techniques. Some studies applied a recursive model, where the causation is assumed to occur in one direction while some incorporate a non-recursive model where the causal direction is not unidirectional. Some studies also incorporate the mediation and moderation effect on substance use. The multiple indicators multiple cause model (MIMIC) is used to examine the association between substance use and socio-demographic factors. Latent growth curve modelling is carried out using the approaches of structural equation modelling. It was found that latent growth models have been used in several studies for analysis of longitudinal substance use data, and to examine the moderation effect. Studies firstly use the associative two-factor unspecified latent growth model to examine the form of growth and the level and pattern of association that existed among the growth parameters of substance after that factor of curve employed finally curve of factor employed [19,21]. For employing latent growth, a large sample size and multi normally distributed variables are required. The general linear model is applied in a cross-sectional study to predict probabilities of using substances among adolescents across different categories. Principal component analysis generally is used for extracting the major components and it is employed with oblique rotation for the factor analysis of parenting style items on substance use. Meanwhile, factor analysis is also employed in mentioned studies for constructing and identifying the unobserved latent variables playing as major role for substance use. Both the exploratory and confirmatory factor analysis are employed in earlier studies. PCA and factor analysis are different data extraction techniques; the main aim of principal component analysis is data reduction, whereas factor analysis is employed for latent construction [76].

Despite the identification of the major risk and protective factors of adolescent substance use, which has significant implications for both adolescents and society, the study

has some limitations. This study typically selected its articles based on a set of inclusion and exclusion criteria. However, since studies that meet the criteria may not be representative of the larger population of studies on the subject, this could result in selection bias. This review article includes fifty research articles, which vary considerably in their methodologies, sample characteristics and outcome measures. As a result, making clear judgments was really challenging.

5. Conclusions

Over the past 30 years, adolescent substance use has gained importance to researchers, policymakers and stakeholders due to its growing health threats and consequences. To prevent and delay adolescent substance use, it is necessary to understand the risk and protective factors of adolescent substance use. The current study identified several risks and protective factors for adolescent substance use through an intensive examination of fifty studies. Several new dimensions should be incorporated into future research to find out the effect of parental discord, neighbourhood attachment, isolation and childhood maltreatment on adolescent substance use. There are several potential areas of research related to adolescent substance use that should be explored. Longitudinal studies conducted over an extended period that track adolescent substance use patterns can provide insights into the factors that predict initiation, escalation and cessation of substance use. Additionally, research on digital interventions for substance use is a promising area to explore. Furthermore, there is a scarcity of research on the application of event analysis, which can be useful in identifying the age of onset of substance use among adolescents. Several studies revealed that illicit substances pose a significant threat to public health, but after a review, it was found that most researchers restrain their research only to licit substances. To prevent the early onset of substance use, several concerted interventions should be implemented, such as regulating the price and accessibility of substances, increasing the legal age of purchasing, introducing an intervention programme in schools, academic monitoring, providing social support, establishing clear expectations between parents and children, addressing family trauma and strengthening family relationships, increasing awareness by appropriate materials and interactive activities, family health history assessment, encourage healthy lifestyle habits, address mental health concerns, develop a family health plan, family counselling, substance abuse treatment and good communication with adolescents.

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