



Cyberbullying Roles and the Use of Psychoactive Substances: A Systematic Review

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Abstract

Cyberbullying and psychoactive substance use are two common risky behaviors among adolescents, and a growing body of documents observe associations between these two phenomena. The present systematic review aims to clarify this association, analyzing the use of both legal and illegal psychoactive substances and all cyberbullying roles. To this purpose, a systematic search on PubMed, Scopus and PsycInfo databases was conducted, focusing on adolescents aged between 10 and 20 years old. The review was carried out following the Preferred Reporting Items for Systematic Reviews and Meta-Analyses guidelines, and it includes a total of fifty original articles. The majority of them observed a positive association between cyberbullying involvement and the use of psychoactive substances, especially tobacco and alcohol. Regarding moderator factors, some studies observed the aforementioned association only among girls. Moreover, controlling for gender, delinquent friends and low parental support, this association became not significant. Nevertheless, there was a lack of information about the role of those who witnessed cyberbullying, and the included articles showed mixed results regarding illegal substance use. The findings highlighted the need for further research in order to better clarify the association between cyberbullying and substance use, and equally explore all cyberbullying roles and substance types.

Keywords Cyberbullying · Psychoactive substance use · Alcohol use · Cigarettes smoking · Adolescents

Introduction

Cyberbullying is a relatively new phenomenon that has gained increasing attention. Together with substance use, it is a common behavior, especially among adolescents. They both pose health risks and are the target of preventive measures; this is particularly relevant during a vulnerable period of life such as adolescence (Kowalski et al., 2019; ESPAD Group, 2020). Besides, it has been suggested in the literature

that these two behaviors may be related, although the results are still unclear and not systematized. Using these presumptions as a starting point, this study sought to systematically review the literature on the association between substance use and cyberbullying behaviors among adolescents, focusing on different substance types and different cyberbullying roles.

Cyberbullying behaviors include any conduct performed with the purpose to inflict harm or discomfort on others, through electronic or digital media. (Tokunaga, 2010) It can be perpetrated by individuals or groups and it may include, for instance, sending hostile or aggressive messages and insulting or making fun of others. Literature identifies four distinct cyberbullying roles: cyber-victims (subjects who are cyberbullied), cyber-perpetrators (subjects who perpetrate cyberbullying), cyber-victim-perpetrators (those who are both victims and perpetrators) and bystanders (subjects who witness an episode related to cyberbullying) (Gámez-Guadix et al., 2015; Lozano-Blasco et al., 2020).

Regarding prevalence, previous studies show heterogeneous results observing a lifetime prevalence range of

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4.9–65.0% of cyberbullying victimization and of 1.2–44.1% of cyberbullying perpetration; the last-year range prevalence was respectively 1.0–61.1% and 3.0–39.0% (Brochado et al., 2017; Kowalski et al., 2019). In general, cyberbullying could be considered an emergent public issue. The online nature of this phenomenon makes it highly pervasive: the victim can be reached anonymously in any context of their life, and any cyber-threat can remain online and viewed by several people, thus prolonging the exposure to offense and increasing the potential harm (Tokunaga, 2010; Sorrentino et al., 2019). In fact, cyberbullying is associated with several factors related to social and psychological well-being such as a low level of self-esteem (Brewer & Kerslake, 2015; Palermi et al., 2017), internalizing symptoms (Martínez-Monteagudo et al., 2020; Turlu et al., 2020) and even suicidal ideation (Bai et al., 2021).

Numerous articles have pointed out an association between certain roles in cyberbullying and the use of psychoactive substances. However, the results are not entirely clear and there is a lack of systematization in order to differentiate between different roles and different types of substances. In 2021, a systematic review of the literature concerning cyber and traditional bullying perpetration and substance use was conducted (Arcadepani et al., 2021). It pointed out that both bullies and cyberbullies are more likely to be engaged in the use of psychoactive substances, both legal and illegal. However, the systematic review primarily investigated traditional bullying phenomena considering that the research strategy used key terms that did not contain the term “cyberbullying”. Moreover, it only considered the perpetrator role, disregarding the other ones. Based on this, to date there are no systematic reviews that have purposefully examined the association between the use of psychoactive substances and cyberbullying with respect to all cyberbullying roles.

The Current Study

Taking into account that cyberbullying and substance use are public health issues and there is a lack of systematization of the literature results about the relationship between them, the purpose of this study is to systematically review and analyze the original articles that investigated the potential association between being cyber-victim, or cyber-perpetrator, or cyber-victim-perpetrator, or bystander, and legal or illegal psychoactive substance use. More in detail, this systematic review considered original articles without a restriction on the studies' year of publication and it is focused on adolescents aged between 10 and 20 years.

Methods

This systematic review was conducted in conformity with the Preferred Reporting Items for Systematic Reviews and Meta-Analysis (PRISMA) guidelines (Moher et al., 2009) (Appendix B supplementary materials). In order to investigate the relationship between cyberbullying and psychoactive substance use, articles related to all cyberbullying roles (cyber-victim, cyber-perpetrator, cyber-victim-perpetrator, bystander) and the use of both legal and illegal psychoactive substances among adolescents were included. The protocol of this review was registered in The International Prospective Register of Systematic Reviews (PROSPERO) database (ID number: CRD42021254623) (<https://www.crd.york.ac.uk/prospero/logout.php>). The records identified and included in this qualitative synthesis showed a high degree of heterogeneity in terms of methodology, instruments used, and statistical analysis precluding a meta-analysis.

Eligibility Criteria and Search Strategy

In this qualitative synthesis, records that investigated the cyberbullying phenomenon and substance use in the population aged between 10 and 20 years were included. A systematic and online search of literature published from the database inception to the end of July 2022 was performed, using three different databases as part of the research: Scopus PsycINFO and PubMed. Database research was conducted employing the keywords and terms described in Appendix A. Given the lack of a general agreement on the cyberbullying terminology (Tokunaga, 2010), a careful search in the reference sections of the included records was also conducted, in order not to miss any possible eligible article. There wasn't any limit for the articles' year of publication and the only exclusion criteria were the following: (1) subjects older than 20 years old, (2) articles in languages other than English, (3) clinical populations, (4) review or meta-analysis, (5) studies out of the scope of this qualitative synthesis (e.g., articles that considered only traditional bullying and not cyberbullying, or articles that do not directly investigate the association between substance use and cyberbullying). The search strategy was enacted by four of the authors (MB, SB, FB, and FM); two of them (MB and SB) removed duplicates and excluded irrelevant articles after screening titles and abstracts and other two authors (FB and FM) screened full-text articles assessing their eligibility, in conformity with the inclusion/exclusion criteria. Mendeley Desktop was used to support the systematic search (<https://www.mendeley.com/download-desktop-new/>).

The articles included in the systematic review have been described in a synoptic table (see Table 1). The results are described differentiating, where possible, by type of

Table 1 Summary of studies

Legal substances									
Authors and year	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
Sourander et al., 2010	Finland	2 215 students, 50.0% girls	13–16 M = 14.4(1.1)	Cross-sectional	-	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Alcohol and intoxications, and cigarettes	Alcohol: legal age for buying beverages: 18 years (beverages that contain up to 22% alcohol by volume) 22 years stronger ones. Purchasing drinks: 18 years. Cigarettes: legal age for buying: 16 years	Alcohol use, being drunk, and smoking were positively associated with being a cyber-perpetrator and with being a cyber victim-perpetrator.
Goebert et al., 2011	USA	677 students, 60.2% girls	Grade 10th to 12th	Cross-sectional	-	Cyber-victim	Alcohol (binge drinking)	Alcohol: legal age for buying and purchasing drinks: 21 years.	Binge drinking was positively associated with being cyber-victims.
Vieno et al., 2011	Italy	2 667 students, 50.1% boys	Students selected from middle schools, grade 8 (N = 1 393; M = 13.92) and high schools, grade 10 (N = 1 250; M = 15.83)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Alcohol and cigarettes	Alcohol: legal age for buying beverages: 18 years. Purchasing drinks: always. Cigarettes: legal age for buying: 18 years	All forms of bullying behaviour were associated with legal substance use.

Table 1 (continued)

Legal substances												
Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings			
Elgar et al., 2014	USA	18 834 students, 50.7% girls	12–18 M = 15.0(1.7)	Cross-sectional	DCYA	Cyber-victim	Alcohol (i.e. binge drinking and intoxications), prescription drugs, and over-the-counter drugs	Alcohol: legal age for buying and purchasing over-the-counter drinks: 21 years.	Binge drinking, being drunk, prescription drug misuse, and over-the-counter drug misuse were positively associated with being cyber-victims.			
Sampasa-Kanyinga et al., 2014	Canada	3 509 students, 54.9% girls	11–20 M = 14.5(1.8)	Cross-sectional	YRBS	Cyber-victim	Alcohol and cigarettes	Alcohol: legal age for buying and purchasing drinks: 19 years in most provinces 18 years in the other ones- Cigarettes: legal age for buying: 18 years	The percentages of students who used alcohol or smoked cigarettes were significantly higher among cyber-victim compared with the whole sample			
Chang et al., 2015	China	1 808 students, 54.1% girls	7th to 9th grade	Cross-sectional	-	Cyber-victim, cyber-perpetrator	Alcohol and cigarettes	Alcohol: legal age for buying and purchasing drinks: 18 years Cigarettes: legal age for buying: 18 years	Alcohol and cigarette use were positively associated with being cyber-perpetrator and being cyber-victim			

Table 1 (continued)

Legal substances		Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
Sampasa-Kanyinga & Hamilton, 2015	Canada	5 329 students, 48.2% girls	12–20 M = 15.2(1.9)	Cross-sectional	OSDUHS		Cyber-victim	Alcohol and cigarettes	Alcohol: legal age for buying and purchasing drinks: 19 years in most provinces 18 years in the other ones- Cigarettes: legal age for buying: 18 years	Alcohol and cigarette use were positively associated with being cyber-victims.
Chan & La Greca, 2016	USA	1 064 students, 58% girls	13–19 M = 15.8(1.2)	Cross-sectional	C-PEQ and YRBS		Cyber-victim, cyber-perpetrator	Alcohol (alcohol use and binge drinking) and cigarettes	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-victims was positively associated with all associated substances but these associations were not relevant controlling for being an online or offline cyber-perpetrator. Being cyber-perpetrators was positively associated with all the analyzed substance

Table 1 (continued)

Legal substances											
Authors and year	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings		
Wright, 2016	USA	867 students, 51.0% girls	13–15 M = 13.7	Longitudinal	-	Cyber-victim	Alcohol and cigarettes	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-victims was positively associated with subsequent alcohol use and cigarette use.		
Kritsotakis et al., 2017	Greece	812 students, 66.1% girls	M = 19.3	Cross-sectional	ESPAD	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Alcohol (alcohol use and intoxication) and cigarettes.	Alcohol: legal age for buying drinks: 18 years. Cigarettes: legal age for buying: 18 years.	Being a cyber victim-perpetrator was positively associated with smoking among males, controlling for maternal and paternal education level, current residence, age, and country of origin		
Carvalho et al., 2018	Portugal	6 026 adolescents, 52.3% girls	10–20 M = 13.8(1.7)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Alcohol and cigarettes	Alcohol: legal age for buying drinks: 18 years. Cigarettes: legal age for buying: 18 years.	Cyber-perpetrator and cyber victim-perpetrators reported consuming more alcohol than cyber-victims. No associations were found concerning cigarette smoking. The Type of Cyberbullying Involvement × Gender effect interactions were not significant.		

Table 1 (continued)

Legal substances		Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
		Lee et al., 2018	USA	7 189 students, 51.7% girls	11–17 M = 14.2(1.4)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Alcohol (use and intoxications) and cigarettes	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-perpetrators or being cyber victim-perpetrators were positively associated with alcohol use, drunkenness, and cigarette smoking but the associations were not still statistically relevant adjusted by interaction with cyber-perpetration and parental monitoring and delinquent friends.
		Priesman et al., 2018	USA	11 868 students, 51.2% girls	12–18 M = 16.1	Cross-sectional	YRBS	Cyber-victim	Alcohol (binge drinking)	Alcohol: legal age for buying and purchasing drinks: 21 years.	Binge drinking was positively associated with being cyber-victims but the association was not relevant among males.
		Sampasa-Kanyinga et al., 2018	Canada	5 478 students	12–20 M = 15.2(1.8)	Cross-sectional	OSDUHS	Cyber-victim	Alcohol (binge drinking) and cigarettes	Alcohol: legal age for buying and purchasing drinks: 19 years in most provinces 18 years in the other ones. Cigarettes: legal age for buying: 18 years	Binge drinking and cigarettes use were positively associated with being cyber-victims but the relationship is not statistically relevant adjusted by interaction with parent-relationship and sex

Table 1 (continued)

Legal substances																				
Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings											
Wiguna et al., 2018	Indonesia	2 917 adolescents	11–18																	
Baiden & Tadeo, 2019	USA	9 974 students, 50.1% girls	14–18	Cross-sectional	YRBS	Cyber-victim	Alcohol and cigarettes	Alcohol: legal age for buying drinks: 18 years. Cigarettes: legal age for buying: 18 years.	Male cyber-perpetrator showed an increased risk for cigarette smoking; male cyber-victim and cyber-victim-perpetrator and female cyber-victim-perpetrator showed a higher risk to consume alcohol											
Graham & Wood, 2019	USA	15 624 students, 50.3% boys	9th to 12th grade	Cross-sectional	YRBS	Cyber-victim	Alcohol	Alcohol: legal age for buying and purchasing drinks: 21 years.	Alcohol consumption was associated with being cyber-victims.											

Table 1 (continued)

Legal substances											
Authors and year	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings		
Kim et al., 2019	Canada	4 940 students, 56.7% girls	M = 15.1	Cross-sectional	OSDUHS	Cyber-victim	Alcohol (binge drinking), cigarettes, and non-medical drugs	Alcohol: legal age for buying and purchasing drinks: 19 years in most provinces 18 years in the other ones- Cigarettes: legal age for buying: 18 years	Binge drinking, cigarette smoking, and non-medical drugs use were positively associated with being cyber-victims among females but not among males.		
Rodríguez-Enríquez et al., 2019	Spain	765 students, 56.5% girls	14–16 M = 15.0(0.7)	Cross-sectional	GCS	Cyber-victim	Alcohol and cigarettes	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Alcohol and cigarette use were positively associated with being cyber-victims.		

Table 1 (continued)

Legal substances												
Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings			
Wright & Wachs, 2019	USA	867 students, 51.1% girls	13–15 M013.7	Longitudinal		Cyber-victim, cyber-perpetrator	Alcohol and cigarettes	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-victims or cyber-perpetrators were positively associated with subsequent alcohol use and cigarette smoking. There was a significant interaction of instructive parent mediation of technology use in the relationship between being cyber-victims and alcohol use.			
Yoon et al., 2019	USA	2 768 students	M = 15.5	Longitudinal	COASI	Witness, witness and cyber-perpetrator, witness and cyber-victim, and cyber victim-perpetrator	Alcohol, cigarettes, cigar, hookah, prescription painkillers, and prescription painkillers	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Cyberbullying role (e.g. being witness, cyber-perpetrators, and/or cyber-victims) was subsequently positively associated with substance use.			
Zhu et al., 2019	China	3 232 students, 52.3% girls	15–17 M = 15.8(0.9)	Cross-sectional	RAS	Cyber-victim	Alcohol (problematic use) and cigarettes	Alcohol: legal age for buying and purchasing drinks: 18 years. Cigarettes: legal age for buying: 18 years	Problematic alcohol use and cigarettes were positively associated with being cyber-victims.			

Table 1 (continued)

Legal substances	Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
	Azami & Teremian, 2020	Iran	400 students, 52.3% girls	M = 16.6(1.0)	Cross-sectional	EVS	Cyber-victim	Alcohol and cigarettes/hookah	Alcohol: it is illegal. Cigarettes: legal age for buying: 18 years.	Alcohol and cigarettes/hookah were positively associated with being cyber-victims.
	Lee et al., 2020	USA	7 084 students 52.9% girls	Boys: M = 14.4(1.4) Girls: M = 14.3(1.4)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Alcohol	Alcohol: legal age for buying and purchasing drinks: 21 years.	Being cyber-victim was associated with alcohol use only among girls
	Carvalho et al., 2021	Portugal	6 026 students, 52.3% girls	10–20 M = 13.8(1.7)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber-perpetrator-victim	Alcohol and cigarettes	Alcohol: legal age for buying drinks: 18 years. Cigarettes: legal age for buying: 18 years.	Alcohol use was positively associated with cyber-perpetration involvement. In particular, cyber victim-perpetrators use significantly more alcohol than cyber-victims only. No significant association emerged concerning cigarette smoking.

Table 1 (continued)

Legal substances	Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
	Ihongbe et al., 2021	USA	3 486 students 50.7% boys	14–19	Cross-sectional	YRBS	Cyber-victim	e-cigarettes	E-Cigarettes: legal age for buying: 21 years.	Being a cyber-victim was not associated with vaping in male students but it was in female students. However, the last association became not significant after controlling for other variables.
	Boccio et al., 2022	USA	8800 students 53.4% girls	M = 14.23(1.99)	Cross-sectional	FYSAS	Cyber-victim	Nicotine vaping	E-Cigarettes: legal age for buying: 21 years.	Cyber bullying victimization is significantly associated with the likelihood of nicotine vaping in the last 30 days
	Nikolaou, 2022	USA	-	-	Longitudinal	YRBS	Cyber-victim	Alcohol and cigarettes	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	There was an association between being cyberbullied and substance use, especially among girls.
	Pichel et al., 2022	Spain	3 173 adolescents, 50.4% girls	12–17 M = 14.44(1.67)	Cross-sectional	AUDIT, CRAFFT Abuse Screening Test, ECIPQ	Cyber-perpetrator, cyber-victim, and cyber victim-perpetrator	Alcohol (consumption, drunkenness and problematic use), tobacco and problematic use of substances in general.	Alcohol: legal age for buying drinks: 18 years. Cigarettes: legal age for buying: 18 years.	Adolescents involved in any cyberbullying role showed a significantly higher rate in the consumption habits and risky consumptions analyzed.

Illegal substance

Table 1 (continued)

Legal substances		Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
		Goebert et al., 2011	USA	677 students, 60.2% girls	Grade 10th to 12th	Cross-sectional		Cyber-victim	Cannabis	Cannabis is considered illegal	Cyber-victimization increased the likelihood of using Marijuana.
		Sampasa-Kanyinga et al., 2014	Canada	3 509 students, 54.9% girls	11–20 M = 14.5(1.8)	Cross-sectional	YRBS	Cyber-victim	Cannabis	Cannabis: legal age for buying and use: 18 years	The percentages of students who tried marijuana or used it occasionally or regularly were significantly higher among cyber-victim compared with the whole sample
		Sampasa-Kanyinga & Hamilton, 2015	Canada	5 329 students, 48.2% girls	12–20 M = 15.2(1.9)	Cross-sectional	OSDUHS	Cyber-victim	Cannabis	Cannabis: legal age for buying and use: 18 years	Cannabis use was positively associated with being cyber-victims.
		Wright, 2016	USA	867 students, 51.0% girls	13–15 M = 13.7	Longitudinal	-	Cyber-victim	Cannabis and other illicit drugs (cocaine, hallucinogens, heroin, inhalants, and prescription drugs)	Cannabis is considered illegal	Being cyber-victims was positively associated with subsequent non-cannabis drug use.
		Kritsotakis et al., 2017	Greece	812 students, 66.1% girls	M = 19.3	Cross-sectional	ESPAD	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Illegal substances (Cannabis, sedatives without a doctor's prescription, amphetamines, hallucinogens, cocaine, heroin, anabolic steroids, drugs by injection with a needle, alcohol together with pills, ecstasy, inhalants)	Cannabis is considered illegal	Being a cyber-victim was positively associated with drug use among girls but this association was not relevant controlling for maternal and paternal education level, current residence, age, and country of origin

Table 1 (continued)

Legal substances												
Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings			
Carvalho et al., 2018	Portugal	6 026 adolescents, 52.3% girls	10–20 M=13.8(1.7)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Drug	-	More cyber-victims reported never consuming drugs and cyber-perpetrators reported consuming more drugs compared to cyber-victims and cyberbully victims. The type of Cyberbullying Involvement × gender effect interactions were not significant.			
Graham & Wood, 2019	USA	15 624 students, 50.3% boys	9th to 12th grade	Cross-sectional	YRBS	Cyber-victim	Cannabis	Cannabis is considered illegal	Cannabis consumption was associated with being cyber-victims.			
Lee et al., 2018	USA	7 189 students, 51.7% girls	11–17 M=14.2(1.4)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber-perpetrator-victim	Cannabis	Cannabis is considered illegal	Being cyber-perpetrators was positively associated with cannabis use but the associations were not still statistically relevant adjusted by interaction with cyber-perpetration and parental monitoring and delinquent friends.			

Table 1 (continued)

Legal substances		Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
Priesman et al., 2018	USA	11 868 students, 51.2% girls	12–18 M = 16.1	Cross-sectional	YBRS		Cyber-victim	Cannabis	Cannabis is considered illegal	Cannabis use was positively associated with being cyber-victims but the association was not relevant among males.
Sampasa-Kanyinga et al., 2018	Canada	5 478 students	12–20 M = 15.2(1.8)	Cross-sectional	OSDUHS		Cyber-victim	Cannabis	Cannabis: legal age for buying and use: 18 years	Cannabis use was positively associated with being cyber-victims but the relationship is not statistically relevant adjusted by interaction with parent-relationship.
Kim et al., 2019	Canada	4 940 students, 56.7% girls	M = 15.1	Cross-sectional	OSDUHS		Cyber-victim	Cannabis	Cannabis: legal age for buying and use: 18 years	Cannabis use was positively associated with being cyber-victims among girls but not among boys.
Wright & Wachs, 2019	USA	867 students, 51.1% girls	13–15 M = 13.7	Longitudinal	-		Cyber-victim, cyber-perpetrator	Cannabis and other illicit drugs (cocaine, hallucinogens, heroin, inhalants, and prescription drugs)	Cannabis is considered illegal	Being cyber-victims or cyber-perpetrators were positively associated with subsequent cannabis or other illicit drugs use. There was a significant interaction of instructive parent mediation of technology use in the relationship between being cyber-perpetrators or cyber-victims and non-cannabis illicit drug use.

Table 1 (continued)

Legal substances												
Authors and year	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings			
Yoon et al., 2019	USA	2 768 students	M= 15.5	Longitudinal	COASI	Witness, cyber-perpetrator, cyber-victim, and cyber victim-perpetrator	Cannabis (combustible or edible) and polysubstance use	Cannabis is considered illegal	Cyber-perpetration role (e.g. being witness, cyberbullies, and/or cyber-victims) was subsequently positively associated with substance use. Being cyber-victims was positively associated with cannabis use but no association was found with opium use.			
Azami & Taremiyan, 2020	Iran	400 students, 52.3% girls	M= 16.6(1.0)	Cross-sectional	EVS	Cyber-victim	Cannabis and opium	Cannabis is considered illegal	Being cyber-victims was positively associated with cannabis use but no association was found with opium use.			
Lee et al., 2020	USA	7 084 students, 52.9% girls	Boys: M= 14.4(1.4) Girls: M= 14.3(1.4)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Cannabis	Cannabis is considered illegal	Being cyber-perpetrators was positively associated with cannabis use only among boys.			
Carvalho et al., 2021	Portugal	6 026 students, 52.3% girls	10-20 M= 13.8(1.7)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Drugs (not specified)	-	No significant association emerged in regard to cyber-perpetration and drug use.			
Boccio et al., 2022	USA	8 800 students, 53.4% girls	M= 14.23(1.99)	Cross-sectional	FYSAS	Cyber-victim	Marijuana vaping	Cannabis is considered illegal	Cyber bullying victimization are associated with marijuana vaping in the last 30 days for females			
Nikolaou, 2022	USA	-	-	Longitudinal	YRBS	Cyber-victim	Cannabis and other drugs	Cannabis is considered illegal	There was an association between being cyberbullied and substance use, especially among girls.			

Table 1 (continued)

Legal substances		Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
Pichel et al., 2022	Spain	3 173 adolescents, 50.4% girls	12–17 M = 14.44(1.67)	Cross-sectional	CAST, CRAFFT Abuse Screening Test, ECIQ	Cyber-perpetrator, cyber-victim, and cyber victim-perpetrator	Cannabis (consumption and problematic use), Cocaine, Ecstasy/amphetamines/hallucinogens and problematic use of substances in general.	Cannabis is considered illegal	Adolescents involved in any cyberbullying role showed a significantly higher rate in the consumption habits and risky consumption analyzed.		
Mixed substances											
Ybarra & Mitchell, 2004	USA	1 501 adolescents, 53% boys	10–17 M = 14.1(2.0)	Cross-sectional	YISS	Cyber-perpetrator	Not specified	-	Being cyber-perpetrators was positively associated with frequent substance use		
Mitchell et al., 2007	USA	1 501 adolescents, 53% boys	10–17 M = 14.1(2.0)	Cross-sectional	YISS	Cyber-victims	Legal: tobacco, alcohol; Illegal: marijuana, inhalants, and any other drugs	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being a cyber-victim, in terms of online sexual solicitation, was positively associated with the number of used substances.		
Hinduja & Patchin, 2008	USA	1 378 students	M = 14.8	Cross-sectional	-	Cyber-victim	Legal: alcohol Illegal: cannabis	Alcohol: legal age for buying and purchasing drinks: 21 years.	Substance use was positively associated with being cyber-victims and cyber-perpetrators		

Table 1 (continued)

Legal substances		Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
Gómez-Guadix et al., 2013	Spain	845 students.	13–17 M = 15.2(1.2)	Longitudinal	CQ	Cyber-victim, cyber victim-perpetrator	Legal: tobacco alcohol. Illegal: speed, LSD, ecstasy, hashish, others.	Alcohol: legal age for buying drinks: 18 years. Cigarettes: legal age for buying: 18 years.	Cyber victim-perpetrators reported both current and subsequent higher substance use than cyber-victims only. Substance use predicted more cyber victimization-perpetration but not <i>vice-versa</i> .	
Litwiler & Brausch, 2013	USA	4 693 students, 53% boys	14–19 M = 14.1(1.2)	Cross-sectional	YRBS	Cyber-victim	Legal: alcohol, cigarettes, and smokeless tobacco. Illegal: marijuana, inhalants, LSD, ecstasy, cocaine, crack, heroin, methamphetamine, and tranquilizers.	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-victims was positively associated with substance use.	
Low & Espelage, 2013	USA	1 023 students, 50.2% boys	10–15 M = 13.9(1.1)	Longitudinal	-	Cyber-perpetrator	Alcohol and other drugs	Alcohol: legal age for buying and purchasing drinks: 21 years.	There was a cross-sectional and longitudinal association between cyber-perpetration and substance use	
Reed et al., 2015	USA	15 425 students, 50.4% girls	M = 16.1(1.4)	Cross-sectional	YRBS	Cyber-victim	Legal: alcohol and sniffing glue Illegal: cannabis, cocaine, and heroin.	Alcohol: legal age for buying and purchasing drinks: 21 years.	Substance use was positively associated with being cyber-victims.	

Table 1 (continued)

Legal substances												
Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings			
Baker & Pelfrey, 2016	USA	3 195 students, 52.0% girls	Grade 6th to 12th	Cross-sectional	YRBS	Cyber-victim	Soft drugs: legal (Alcohol, cigarettes) and illegal (cannabis), Hard drugs: legal (prescription drugs) and illegal (cocaine, methamphetamine, ecstasy, heroin)	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-victims was positively associated with both soft drug and hard drug use directly and mediated by anticipated strain (i.e., feeling unsafe at school).			
Merril & Hanson, 2016	USA	13 583 students, 51.2% boys	Grade 9th to 11th	Cross-sectional	YRBS	Cyber-victim	Legal: alcohol, cigarettes. Illegal: cannabis, steroids.	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-victims was positively associated with substance use			
McCuddy & Esbensen, 2017	USA	3 271 students, 51% girls	11–18 M = 13.9(1.3)	Longitudinal		Cyber-victim	Illegal substance	-	Cyber-victims were more likely to use illegal substances			

Table 1 (continued)

Legal substances												
Authors and year	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings			
Cénaat et al., 2018	Canada	1 540 students	14–20	Cross-sectional	-	Cyber-victim	Legal (alcohol) Illegal (Cannabis, ecstasy, amphetamine, speed, cocaine, acid)	Alcohol: legal age for buying and purchasing drinks: 19 years in most provinces 18 years in the other ones- Cannabis: legal age for buying and use: 18 years	Being cyber-victims was positively associated with substance use both directly and mediated by psychological distress			
Brady et al., 2019	USA	3 139 students, 52% girls	Grade 6th to 11th	Cross-sectional	YRBS	Cyber-victim	Soft drugs (alcohol, cigarettes, cannabis). Hard drugs (Oxycontin, Percocet, Vicodin, Ritalin, or Xanax without medical prescription, cocaine, crack, methamphetamines, ecstasy or heroin)	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	There was an association between being cyber-victims and both soft and drugs use.			
Choi et al., 2019	USA	5 726 students	43,435	Cross-sectional	NCVS	Cyber-victim	Availability of substances and being on drug or alcohol at school	-	Availability of substances and being on drug or alcohol at school were positively associated with being cyber-victims.			

Table 1 (continued)

Legal substances											
Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings		
Diaz & Fite, 2019	USA	260 students	11–15 M = 12.24(0.9)	Longitudinal	ECIPQ	Cyber-victim	Alcohol, cigarettes, vaporizers/e-cigarettes, and marijuana	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years. E-Cigarettes: legal age for buying: 21 years.	Cyber-victimization was linked to an increased risk for both current and subsequent substance use		
Mehari et al., 2020	USA	1 542 adolescents, 51:0% girls	M = 12.71 (0.9)	Longitudinal	PBFS-AR	Cyber-victim	Legal (alcohol, cigars, cigarette). Illegal (inhalants, cannabis)	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	Being cyber-victims did not influence subsequent substance use but it influenced the concurrent substance use.		
Mohseny et al., 2020	Iran	1 456 students, 54.5% boys	12–17	Cross-sectional		Cyber-perpetrator, cyber-victim	Cigarettes and other substances	Cigarettes: legal age for buying: 18 years.	Smoking and substance use were positively associated with being cyber-victims and being cyber-perpetrators.		

Table 1 (continued)

Legal substances												
Authors	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings			
Guo, 2021	USA	12 642 students, 51.4% girls	Grade 5th to 10th M= 12.85(1.75)	Cross-sectional	HBSC	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Legal (alcohol, cigarette), Illegal (cannabis)	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 21 years.	All considered roles were positively associated with substance use. The three-way interaction with social control and gender moderated the relationship between substance use and being a cyber-perpetrator. The association with being a cyber-victim or cyber-victim-perpetrator was greater when students have fewer negative emotions. The relationship between substance use and being a cyber-victim-perpetrator was moderated by the three-way interaction with delinquent peer association and gender.			

Table 1 (continued)

Legal substances									
Authors and year	Country	Sample size	Age M(sd)	Study design	Survey	Cyberbullying roles	Analysed substances	Policies and legal status of substances	Findings
Samara et al., 2021	UK	1 613	10–16	Cross-sectional	-	Cyber-perpetrator, cyber-victim	Legal (alcohol, cigarette). Illegal (drugs)	Alcohol: legal age for buying and purchasing drinks: 18 years. Cigarettes: legal age for buying: 18 years.	Being a cyber-perpetrator and a cyber-victim had a significant positive predictive effect on substance abuse. Moreover, the correlation between problematic Internet use and substance abuse is partially mediated by cyberbullying involvement.
Shawki et al., 2021	Iraq	1 070 students, 51.8% boys	13–18 M = 15.56(1.41)	Cross-sectional	-	Cyber-perpetrator, cyber-victim, cyber victim-perpetrator	Alcohol, tobacco and other drugs	Alcohol: legal age for buying and purchasing drinks: 21 years. Cigarettes: legal age for buying: 18 years.	Being a cyber-victim or a cyber victim-perpetrator was significantly associated with substance use
McField et al., 2022	USA	1 232	10–15 M = 13.09(1.05)	Cross-sectional	OBVQ	Cyber-victimization	Substance use	-	Cyber-victimization was associated with substance use.

M(sd) = Mean (standard deviation)

AUDIT, Alcohol Use Disorders Identification Test; C-PEQ, Cyber Peer Experiences Questionnaire; CAST, Cannabis Abuse Screening Test; COASI, Cyber-perpetrators, and Online Aggression Survey Instrument; CQ, Cyber-Bullying Questionnaire; DCYA, Dane County Youth Assessment; ECIPQ, European Cyberbullying Intervention Project Questionnaire; ESPAD, European School Survey Project on Alcohol and other Drugs; EVS, E-Victimization Scale; FYSAS, Florida Youth Substance Abuse Survey; GCS, Garaigordobil Cyber-victimization Scale; HBSC, Health Behaviour in School-aged Children; NCVS, National Crime Victim Survey; OSDUHS, Ontario Student Drug Use and Health Survey; OBVQ, Olweus Bully/victim Questionnaire; PBFS-AR, Problem Behavior Frequency Scale-Adolescent Report (Version 2.0); RAS, The Relational Aggression Scale; YISS, Youth Internet Safety Survey, YRBS, Youth Risk Behavior Survey

substance and role in the cyberbullying. In particular, the synoptic table was divided into three sections. The first section describes the results for substances considered legal in the majority of the analyzed countries. The second section describes the results for substances considered illegal at any age in the majority of the analyzed countries. The third section describes the studies that did not specify or distinguish by substance type and considered them as mixed. As the legal status of many substances in almost all countries varies according to age, for each country in which the study is set, the main policies have been specified. However, it is reasonable to assume that the consumption of legal substances and the consumption of illegal substances may be different behaviors and, therefore, they are described separately.

Quality Assessment

With the aim of assessing the risk of bias in the records, two of the authors (FB and SB) independently completed the Standard Quality Assessment Criteria (SQAC) (Kmet et al., 2004) (Table 2) for each of the included records. SQAC allows for the quality assessment of both quantitative and qualitative studies in terms of research object, study design, sample size, methods, and outcomes, for a total of 14 criteria. Specifically, articles are scored by assigning one out of four different levels (no = 0, partial = 1, yes = 2, n/a = not applicable) for each assessment criterion. Inapplicable criteria were excluded from the scoring. The manual summarizing score was calculated by summing the total score reached by each article (considering only applicable criteria) and then dividing it by the total possible score (14 minus n/a x 2). The summarizing scores of the records included in this qualitative synthesis ranged from 0.64 to 1.00 (Table 2).

Results

A total of 554 records were identified from Scopus (n = 263), PsycINFO (n = 334); PubMed (n = 92) and other sources (i.e. references of the included articles) (n = 3). 349 articles were screened after removing duplicates. 166 of 349 records were excluded based on title and abstract assessment while 183 articles were evaluated for the final eligibility. 133 records were subsequently excluded on different grounds including: being a review, a meta-analysis, a study protocol, or reporting a study out of research scope. Finally, 50 articles, both cross-sectional and longitudinal observational, were included in the qualitative synthesis (Fig. 1). The included articles yielded a total sample size of 215,034 adolescents, aged between 10 and 20 years.

Of the 50 records, eleven studies investigated only legal psychoactive substances (Sourander et al., 2010; Vieno et

al., 2011; Elgar et al., 2014; Chang et al., 2015; Chan & La Greca, 2016; Wiguna et al., 2018; Baiden & Tadeo, 2019; Chan et al., 2019; Rodriguez-Enriquez et al., 2019; Zhu et al., 2019; Ihongbe et al., 2021), while a total of nineteen studies investigated the association between cyberbullying and both legal and illegal psychoactive substance use (Goebert et al., 2011; Sampasa-Kanyinga et al., 2014; Sampasa-Kanyinga & Hamilton, 2015; Wright, 2016; Kritsotakis et al., 2017; Carvalho et al., 2018; Graham & Wood, 2019; Lee et al., 2018; Priesman et al., 2018; Sampasa-Kanyinga et al., 2018; Kim et al., 2019; Wright & Wachs, 2019; Yoon et al., 2019; Azami & Taremian, 2020; Lee et al., 2020; Carvalho et al., 2021; Boccio et al., 2022; Nikolaou, 2022; Pichel et al., 2022). Furthermore, twenty of the included studies examined the association between cyberbullying and psychoactive substance use without differentiating substance types (Ybarra & Mitchell, 2004; Mitchell et al., 2007; Hinduja & Patchin, 2008; Low & Espelage, 2013; Gámez-Guadix et al., 2013; Litwiller & Brausch, 2013; Reed et al., 2015; Baker & Pelfrey, 2016; Merrill & Hanson, 2016; McCuddy & Esbensen, 2017; Cénat et al., 2018; Brady et al., 2019; Choi et al., 2019; Díaz & Fite, 2019; Mehari et al., 2020; Mohseny et al., 2020; Guo, 2021; Samara et al., 2021; Shawki et al., 2021; McField et al., 2022).

Psychoactive Substance Use and Cyber-victimization

Several authors found a significant link between being a cyber-victim (C-V) and using both legal and illegal psychoactive substances. Concerning alcohol use, many studies found positive associations between being a C-V and alcohol-related consumption and behaviors (Vieno et al., 2011; Goebert et al., 2011; Elgar et al., 2014; Sampasa-Kanyinga et al., 2014; 2015; Chan & La Greca, 2016; Wright, 2016; Lee et al., 2018; Carvalho et al., 2018; Chan et al., 2019; Graham & Wood, 2019; Priesman et al., 2018; Wiguna et al., 2018; Rodríguez-Enriquez et al., 2019; Wright & Wachs, 2019; Yoon et al., 2019; Zhu et al., 2019; Lee et al., 2020; Azami & Taremian, 2020; Nikolaou, 2022; Pichel et al., 2022). In particular, concerning the behaviors linked with alcohol, findings showed a relationship between being a C-V and binge drinking (Goebert et al., 2011; Elgar et al., 2014; Chan & La Greca, 2016; Priesman et al., 2018; Kim et al., 2019; Nikolaou, 2022), and getting drunk (Elgar et al., 2014); Zhu and colleagues (2019) observed a positive association between problematic drinking and cyberbullying victimization. Regarding cigarette consumption, several authors observed a significant association with being a C-V. Specifically, the majority of studies found a positive link between cyber-victimization and tobacco consumption (Vieno et al., 2011; Sampasa-Kanyinga et al., 2014; Kritsotakis et al., 2017; Sampasa-Kanyinga et al., 2018; Kim

Table 2 The Standard Quality Assessment Criteria, (Kmet, Lee & Cook, 2004)

Authors and year	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	Total	Score	
Ybarra & Mitchell (2004)	1	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95
Mitchell et al. (2007)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Hinduja & Patchin (2008)	1	1	1	1	2	n/a	n/a	2	1	2	n/a	1	2	2	2	15	0.75
Sourander et al. (2010)	2	2	2	2	2	n/a	n/a	2	1	2	n/a	0	2	2	2	17	0.85
Goebert et al. (2011)	2	2	2	1	2	n/a	n/a	2	1	2	1	2	2	2	2	19	0.86
Vieno et al. (2011)	2	2	2	2	2	n/a	n/a	2	2	2	2	1	2	2	2	21	0.95
Gómez-Guadix et al. (2013)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Litwiler & Brausch (2013)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95
Low & Espelage (2013)	2	2	2	1	2	n/a	n/a	2	2	2	1	2	2	2	2	20	0.90
Elgar et al. (2014)	2	1	1	1	2	n/a	n/a	2	1	2	n/a	2	2	1	2	16	0.80
Sampasa-Kanyinga et al. (2014)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	1	2	21	0.95
Chang et al. (2015)	2	2	2	2	1	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95
Reed et al. (2015)	2	1	1	1	2	n/a	n/a	2	2	2	n/a	2	2	2	2	18	0.90
Sampasa-Kanyinga et al. (2015)	2	2	2	2	1	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95
Baker & Pelfrey (2016)	2	2	2	2	2	n/a	n/a	2	1	2	n/a	2	2	2	2	19	0.95
Chan & LaGreca (2016)	2	2	2	2	2	n/a	n/a	2	2	2	1	2	2	2	2	21	0.95
Merrill & Hanson (2016)	2	2	2	2	2	n/a	n/a	1	1	2	n/a	1	2	2	2	17	0.85
Wright (2016)	2	2	2	2	2	n/a	n/a	2	2	2	n/a	0	2	2	2	18	0.90
Kritsiotakis et al. (2017)	2	2	2	2	2	n/a	n/a	2	1	2	1	2	2	2	2	20	0.90
McCuddy & Esbensen (2017)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Carvalho et al. (2018)	2	2	2	2	2	n/a	n/a	2	2	2	n/a	1	2	2	2	19	0.95
Cénat et al. (2018)	2	2	2	2	1	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95
Lee et al. (2018)	2	2	2	2	2	n/a	n/a	1	2	2	2	2	2	2	2	21	0.95
Priesman et al. (2018)	2	2	2	2	2	n/a	n/a	1	2	2	n/a	2	2	2	2	18	0.90
Sampasa-Kanyinga et al. (2018)	2	2	2	2	2	n/a	n/a	2	2	2	n/a	2	2	2	2	20	1.00
Wiguna et al. (2018)	2	2	1	1	2	n/a	n/a	2	2	2	n/a	1	2	2	2	20	0.90
Baiden & Tadeo (2019)	2	2	2	2	2	n/a	n/a	1	2	2	2	2	2	2	2	21	0.95
Brady et al. (2019)	2	2	1	1	2	n/a	n/a	2	2	2	n/a	2	2	2	2	19	0.95
Chan et al. (2019)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	1	2	21	0.95
Choi et al. (2019)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Diaz & Fite (2019)	2	2	1	1	2	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95
Graham & Wood (2019)	2	2	2	2	2	n/a	n/a	2	2	2	2	1	2	2	2	21	0.95
Kim et al. (2019)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Rodriguez-Enriquez et al. (2019)	2	2	2	2	2	n/a	n/a	1	1	2	2	2	2	2	2	20	0.90
Wright & Wachs (2019)	2	2	2	2	2	n/a	n/a	0	2	2	n/a	2	2	2	2	18	0.90
Yoon et al. (2019)	2	2	2	2	2	n/a	n/a	n/a	2	2	1	2	2	2	2	19	0.95
Zhu et al. (2019)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Azami et al. (2020)	2	2	1	1	2	n/a	n/a	1	1	2	n/a	1	2	2	2	16	0.80
Lee et al. (2020)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Mehari et al. (2020)	2	1	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95

Table 2 (continued)

Authors and year	C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	Total	Score	
Mohseny et al. (2020)	2	2	2	1	1	n/a	n/a	0	1	1	1	1	1	2	2	14	0.64
Carvalho et al. (2021)	2	2	2	1	1	n/a	n/a	1	2	1	2	2	2	2	2	18	0.90
Guo (2021)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Ihongbe et al. (2021)	2	2	2	2	2	n/a	n/a	2	2	2	1	2	2	2	2	21	0.95
Samara et al. (2021)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
Shawki et al. (2021)	2	2	2	2	2	n/a	n/a	2	2	2	1	2	2	2	2	21	0.95
Boccio et al. (2022)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00
McField et al. (2022)	2	2	2	1	1	n/a	n/a	1	1	2	n/a	0	2	2	2	14	0.70
Nikolaou (2022)	2	2	2	2	1	n/a	n/a	2	2	2	2	2	2	2	2	21	0.95
Pichel et al. (2022)	2	2	2	2	2	n/a	n/a	2	2	2	2	2	2	2	2	22	1.00

0: no; 1: partial; 2: yes; n/a: not applicable; C1: Question/objective sufficiently described?; C2: Study design evident and appropriate?; C3: Method of subject/comparison group selection or source of information/input variables described and appropriate?; C4: Subject (and comparison group, if applicable) characteristics sufficiently described?; C5: If interventional and random allocation was possible, was it described?; C6: If interventional and blinding of investigators was possible, was it reported?; C7: If interventional and blinding of subjects was possible, was it reported?; C8: Outcome and (if applicable) exposure measure(s) well defined and robust to measurement / misclassification bias? Means of assessment reported?; C9: Sample size appropriate?; C10: Analytic methods described/justified and appropriate?; C11: Some estimate of variance is reported for the main results?; C12: Controlled for confounding?; C13: Results reported in sufficient detail?; C14: Conclusions supported by the results?

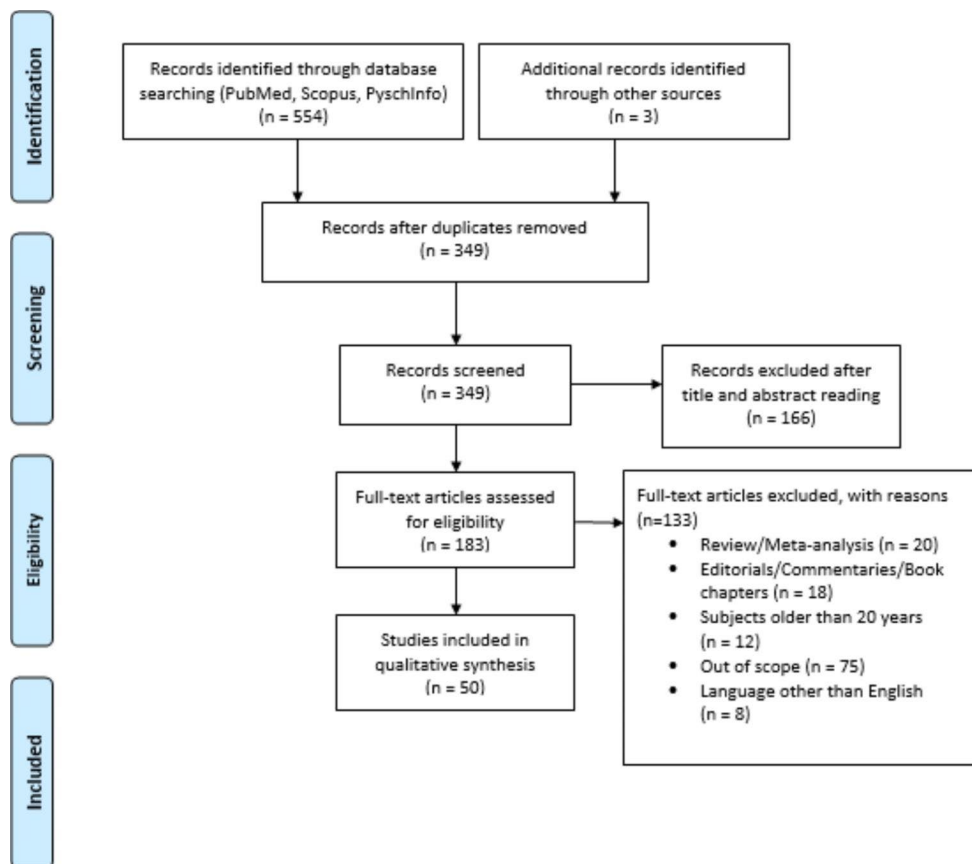
et al., 2019; Rodríguez-Enríquez et al., 2019; Yoon et al., 2019; Zhu et al., 2019; Mohseny et al., 2020; Azami & Taremian, 2020; Nikolaou, 2022; Pichel et al., 2022), hookah, cigars, and e-cigarette use (Yoon et al., 2019), and vaping (Ihongbe et al., 2021; Boccio et al., 2022). Finally, Baiden and colleagues (2019) observed that adolescents who experienced both school bullying and cyber-victimization had higher odds of misusing prescription drugs, while Kim et al. (2019) found a positive association between being a C-V and using non-medical prescription drugs.

On the subject of illegal psychoactive substances, literature findings report a relationship between being a C-V and the use of cannabis (Goebert et al., 2011; Sampasa-Kanyinga et al., 2014; 2015; Graham & Wood, 2019; Sampasa-Kanyinga et al., 2018; Priesman et al., 2018; Kim et al., 2019; Wright & Wachs, 2019; Yoon et al., 2019; Azami & Taremian, 2020; Nikolaou, 2022; Pichel et al., 2022), vaping marijuana among females (Boccio et al., 2022), while Wright (2016) did not detect this association. Moreover, several authors also observed a link between cyber-victimization and non-marijuana and unspecified illegal substance use (Wright, 2016; Wright & Wachs, 2019; Kritsotakis et al., 2017; Nikolaou, 2022). Conversely, Carvalho and colleagues (2018) indicated that more C-Vs reported never consuming drugs compared to non-C-Vs. Finally, many studies observed the association between cyber-victimization and psychoactive substance consumption without differentiating between substance types. Several authors found significant associations between being a C-V and consuming psychoactive substances (Mitchell et al., 2007; Hinduja & Patchin, 2008; Litwiller & Brausch, 2013; Reed et al., 2015; Baker & Pelfrey, 2016; Merrill & Hanson, 2016; McCuddy & Esbensen, 2017; Cénat et al., 2018; Brady et al., 2019; Choi et al., 2019; Díaz & Fite, 2019; Mehari et al., 2020; Mohseny et al., 2020; Guo, 2021; Shawki et al., 2021; McField et al., 2022). Conversely, Gámez-Guadix and colleagues (2013) observed no reciprocal relationships between substance consumption and being a C-V. More specifically, results showed that the substance use (both legal and illegal) can be a predictive factor of cyber-victimization, but authors did not detect an inverse association between these two variables. Summing up, the majority of studies included in this qualitative synthesis found relationships between cyber-victimization and the use of both legal and illegal psychoactive substances, particularly alcohol, tobacco, and cannabis.

Psychoactive Substance Use and Cyber-Perpetration

Much like for cyber-victimization, literature findings pointed out significant associations between cyber-perpetration and the use of legal and illegal psychoactive substances.

Fig. 1 Prisma flow diagram



In particular, regarding the use of legal psychoactive substances, several authors found associations between being a cyber-perpetrator (C-P) and the use of alcohol (Sourander et al., 2010; Vieno et al., 2011; Sampasa-Kanyinga et al., 2014; Lee et al., 2018; Carvalho et al., 2018; Wiguna et al., 2018; Chan et al., 2019; Yoon et al., 2019), getting drunk (Sourander et al., 2010), cigarettes consumption (Sourander et al., 2010; Sampasa-Kanyinga et al., 2014; Lee et al., 2018), e-cig use and prescription painkillers consumption (Yoon et al., 2019). Additionally, several authors observed a significant link between cyber-perpetration and the use of cannabis (Wright & Wachs, 2019; Lee et al., 2020) and unspecified illegal psychoactive substances (Kritsotakis et al., 2017; Carvalho et al., 2018; Yoon et al., 2019; Wright & Wachs, 2019; Carvalho et al., 2021).

In line with these results, when taking into considerations studies which did not differentiate between legal and illegal psychoactive substances, several authors also found significant associations between cyber-perpetration and substance use (Ybarra & Mitchell, 2004; Hinduja & Patchin, 2008; Low & Espelage, 2013; Mohseny et al., 2020; Guo, 2021; Shawki et al., 2021). Moreover, comparing different cyberbullying roles, Pichel and colleagues (2022) pointed out that the C-Ps had the higher rates of consumption of substances. Summing up, as for cyber-victimization, literature findings pointed out

that cyber-perpetration could be associated with risky behaviors such as the use of both legal and illegal psychoactive substances.

Psychoactive Substance Use, Cyber Victimization -Perpetration And Bystanders

Some included articles also took into consideration cyber-victim-perpetrator (C-V-P) and bystander roles, showing a relationship with legal as well as illegal psychoactive substance consumption. Several authors pointed out a link between being a C-V-P and the use of alcohol (Vieno et al., 2011; Lee et al., 2018; Carvalho et al., 2018; Wiguna et al., 2018; Carvalho et al., 2021), drunkenness (Lee et al., 2018), cigarette consumption (Vieno et al., 2011; Lee et al., 2018), cannabis use (Lee et al., 2018; 2020), and unspecified illegal drug use (Carvalho et al., 2021). Furthermore, Yoon and colleagues (2019) observed an association between the role of bystander and the use of alcohol, cigarette and e-cigarette, painkillers with medical prescription, and cannabis.

Psychoactive Substance Use, Cyberbullying and Moderator Factors

Several of the articles included in this systematic review investigated potential moderating factors of the association between cyberbullying and the use of psychoactive substances. The majority of them controlled the analyses for some variables that literature suggested to be associated with the two behaviors (e.g., household income, parental education, ethnicity, etc.). However, it is not possible to establish the specific moderate effect of each variable. Almost all included articles controlled the analyses for gender and age or school grade. Concerning gender differences, many studies considered separately male and female adolescents while the impact of age on the association between substance use and cyberbullying was not directly analyzed. Contrariwise, some authors considered parental and family factors as moderating effects (Elgar et al., 2014; Lee et al., 2018; Carvalho et al., 2018; Wright & Wachs, 2019). In particular, Elgar and colleagues (2014) showed that family dining moderated the association between C-V and the rates of psychoactive substance use. Also, Wright (2016) observed that parental social support moderates the relationship between C-V and subsequent cannabis and other illicit drug use, weakening the associations. Lee and al. (2018) pointed out that parental monitoring acts as an interaction term. When it is introduced in the analysis, the association between being a C-P and marijuana use loses its significance. Moreover, a higher parental monitoring yielded reduced the relationship of being a C-P and marijuana use. In the Carvalho and colleagues' study (2018), the interaction term between cyberbullying and parent–child relationship made the association between C-V and smoking and binge drinking not statistically significant. Finally, Wright and Wachs (2019) found that the relationship between cyber-victimization or cyber-perpetration and non-marijuana illicit drug use was weaker at higher levels of instructive parental mediation of adolescents' technology use.

Concerning other interpersonal variables, many studies considered friend support and peer influence (Wright, 2016; Lee and al., 2018; Gou, 2021). Wright (2016) observed that, similar to parental support, close friend social support moderates the association between C-V and nonmarijuana illicit drug use. Lee and colleagues (2018) showed that having delinquent friends enhances the association between being a C-P, cigarette use and drunkenness, and the association between being a C-V and cigarette and alcohol use. In accordance with this last point, Guo (2021) pointed out that the association between being a C-P and substance use was mediated by the delinquent peer association.

Other authors considered psychological variables. Cénat and colleagues (2018) showed a partial mediator role of

psychological distress on the relationship between cyber-victimization and subsequent substance use; Rodríguez-Enríquez and colleagues (2019) pointed out that personality traits (conscientiousness, emotional instability, and extraversion) moderate the relationship between C-V and substance use, lowering the association with alcohol use and making the association with tobacco consumption not significant.

Discussion

Cyberbullying and substance use are both public health concerns. Literature suggests that there is a possible association between these two behaviors. This study aimed to systematically review the published articles on the association between cyberbullying behaviors and substance use among adolescents aged between 10 and 20 years. It is the first systematic review on this topic and it provides a comprehensive overview of the association between cyberbullying and psychoactive substance use in the adolescent population. The relationship is investigated by differentiating by type of substances and cyberbullying roles.

Cyberbullying is a phenomenon especially linked to adolescence (Ybarra & Mitchell, 2004; Hinduja & Patchin, 2008) and it increased in middle schools to high schools (Elgar et al., 2014). Literature results, collected in this review, indicate a generalized positive association between the phenomenon of cyberbullying and the use of psychoactive substances, opening the question of a possible causal relationship between the two behaviors and giving the opportunity to identify the putative moderators of the association. As mentioned in the introduction, the present study fills the literature gaps, operating at the systematization of cyberbullying and substance use results. Concerning legal substance, the majority of included studies reported an association with cyberbullying behaviors. On the topic of illegal psychoactive substance use, the most explored association was between being a cyber-victim and cannabis use (Goebert et al., 2011; Sampasa-Kanyinga et al., 2014; 2015; Wright, 2016; Lee et al., 2018; Priesman et al., 2018; Sampasa-Kanyinga et al., 2018; Kim et al., 2019; Wright & Wachs, 2019; Yoon et al., 2019; Azami & Taremian, 2020; Lee et al., 2020; Boccio et al., 2022) yielding mixed results.

Literature pointed out some moderating factors that can influence these associations. It emerged a significant role of parents' behaviors (parent-offspring/child relationship and parent-monitoring) in mediating and interacting with the association between cyberbullying roles and psychoactive substance use (Lee et al., 2018; Sampasa-Kanyinga et al., 2018; Wright & Wachs, 2019). These findings are in line with literature data on the influence of parenting on cyberbullying (Elsaesser et al., 2017). Specifically, several

authors suggest that a qualitatively good relationship with parents, and the presence of parent-monitoring influence the involvement in cyber-victimization and cyber-perpetration (Elsaesser et al., 2017; Helfrich et al., 2020). Specifically, substance use could be considered a coping strategy in response to cyber-victimization (Wright, 2016; McField et al., 2022) and a good parent-offspring relationship could, in turn, influence emotional regulation as well as a coping strategy itself, favoring more adaptive ones (Zimmer-Gembeck et al., 2017; Cooke et al., 2019). These results pointed out the importance and the potential effectiveness of parental involvement in awareness and prevention programs related to cyberbullying and associated factors such as the use of psychoactive substances. Gender was a moderator factors of the associations between cyber-victimization and the use of legal and illegal psychoactive substances (Priesman et al., 2018; Kim et al., 2019; Kritsotakis et al., 2017; Ihongbe et al., 2021; Boccio et al., 2022). Authors found significant association between being a cyber-victim and the use of alcohol (Priesman et al., 2018), binge drinking, smoking cigarettes, non-medical drugs consumption (Kim et al., 2019), and e-cigarettes use (Ihongbe et al., 2021) among female students only. In order to find an explanation for this result, it is important to note that girls involved in cyber-victimization may experience more relational, and reputational victimization than boys (Chan & La Greca, 2016; Priesman et al., 2018). It may result in a long-term experience of distress, which is in turn associated with substance consumption (Chan & La Greca, 2016; Priesman et al., 2018). However, other explanations could be related to being female and experiencing maladaptive behaviors such as using psychoactive substances seem to be predictor factors for cyber-victimization (Baldry et al., 2015; Guo, 2016). On the other hand, not all the included studies found gender effect interactions (Carvalho et al., 2018) leaving open the issue of a possible gender effect involved in the association between cyber-victimization and psychoactive substance use. In summary, substance use is related to cyberbullying involvement; however, this relationship is complex and influenced by important factors such as the parent-child relationship, peer influence, and gender. These results emphasize the importance of considering the multidimensionality of cyberbullying and its association with substance use in order to prevent these harmful behaviors and their consequences.

To date it is impossible to determine if there is a casual relationship between cyberbullying and substance use and both behaviors may be related to common mechanisms. For instance, they may be linked to high levels of impulsivity (López-Larrañaga & Orue, 2019; Gullo & Dawe, 2008) or sensation seeking (Evans-Polce et al., 2018; Graf et al., 2019) or to low levels of self-esteem (Donnelly et al., 2008;

Palermi et al., 2017). All these factors were positively associated with both cyberbullying and substance use. In particular, high levels of impulsivity or sensation seeking may lead to perpetuating cyberbullying. In contrast, a low level of self-esteem may be associated with being a cyber-victim and a cyber-perpetrator.

In general, literature findings are primarily focused on cyber-victims, whereas less attention is devoted to cyber-perpetrators and cyber victim-perpetrators. Only one study (Yoon et al., 2019) considers bystanders. Another aspect that should be mentioned is that the roles of cyberbullying are often associated with each other, so many adolescents involved in this phenomenon are both victims and perpetrators (Lozano-Blasco et al., 2020). It is possible to wonder whether the association of multiple roles also leads to a more significant association with the use of psychoactive substances. According to the present review, this question has not yet been fully answered: on the one hand, adolescents who had more than one role in cyberbullying were more likely to use cannabis than those who were involved in only one role (Yoon et al., 2019) and cyber victim-perpetrators use more alcohol than cyber-victim only (Carvalho et al., 2021), on the other hand it is not confirmed by the other cross-sectional studies that consider the role of the cyber victim-perpetrator and its association with cannabis use (Lee et al., 2018; Lee et al., 2020) or with illegal drug use in general (Carvalho et al., 2021). Besides, considering cyberbullying roles, it emerged that some of them were very little explored (i.e. cyber victim-perpetrators and bystanders) making their association with psychoactive substances less transparent and weaker.

Regarding the legal status of substances, some consideration emerged. It is important to note that, even if some substances are legal, they are often forbidden for adolescents. These findings highlight that they are sometimes used also under the age at which they could legally consume. Moreover, given that legal psychoactive substances are more easily accessible compared to illegal ones, these data highlighted the importance of considering their relationship with cyberbullying phenomena in terms of prevention and involvement-monitoring. It is also important to note that in some countries cannabis is considered a legal substance. Among included articles, there are some studies conducted in Canada, where cannabis is legal for people older than 18 years. In line with legal substance results, they all pointed out an association between cannabis use and cyberbullying behaviors (Sampasa-Kanyinga et al., 2014; Sampasa-Kanyinga & Hamilton, 2015; Sampasa-Kanyinga et al., 2018; Kim et al., 2019). Continuing on this point, it also emerged that the legal status and policy on the substances are not uniform for all countries and it may partially be a limitation. For some adolescents included in the analyzed studies

consuming certain substances (e.g. alcohol, cigarettes) may be legal. At the same time, for others, it may be forbidden with different consequences (the policies related to each substance for the considered countries are reported in the synoptic table so that readers can also compare the main finding, differentiating by policy type). Studies often do not distinguish between ages, nor consider the change in the substances' legal status. Anyway, the results are consistent between different countries, giving strength to the findings.

Considering substance types, the literature has analyzed several different substances, but a differentiation according to the frequency or type of use has not been addressed in depth. Specifically, only one study (Pichel et al., 2022) analyzed problematic substance consumption considering alcohol and substance use in general. It showed that adolescents involved in any cyberbullying role had significantly higher rates of problematic use. Considering the increased risk to the health and well-being of adolescents associated with problematic substance use, these results are significant but need further investigations in other studies. Moreover, some types of substances need to be explored more. For instance, e-cigarettes and vaping were little analyzed, while no study considered energy drink consumption. Several studies did not distinguish between the substances investigated but instead used a unique variable comprehending more than one substance, either describing/defining it in the methods or leaving it not fully explained. This may be a further literature limitation because it is not possible to understand the specific relationship with each substance.

Even if most included study controlled for gender, age and other variables that may influence the relationship between cyberbullying and substance use, no study investigated the impact of age on this association. Furthermore, some articles considered school grade instead of age, which may be less precise, given that not all students in a particular grade have necessarily the same age. Further research may focus more on age, given that both substance use and cyberbullying behavior change when young people grow up and go through different stages of adolescence (Hinduja & Patchin, 2008; Elgar et al., 2014).

The present study also pointed out some gaps in the scientific literature. Future studies should investigate these associations further and establish possible causal relationships between the variables. Moreover, this systematic review could help spread awareness of factors impacting cyberbullying and substance use. Despite these important strengths, there are also some limitations. A possible inconsistency could have been raised by the different definitions of “cyberbullying” used in the selected articles. Some older studies could have interpreted the term and phenomenon differently than recent ones. This is also relevant for the choice of keywords in the online search. Considering that some studies were published before a more unambiguous

definition of cyberbullying, the preliminary searches may have potentially missed relevant studies, defining the phenomenon through different terminology. To overcome this bias, a careful search of the bibliographies of the included studies was carried out. Older studies, which, for example, reported the term “online bullying”, were found and included in the analysis. Finally, this systematic review could have been influenced by publication bias, such as language bias, due to studies not published in English being excluded.

Conclusion

The scientific literature reports an association between cyberbullying and substance use. However, the results are often discordant and they need a systematization to better understand this topic. After systematic research on three databases, 50 original articles were included. They were conducted on adolescents aged between 10 and 20 years and written in English. Overall, psychoactive substance was generally associated with cyberbullying involvement, considering both legal and illegal substances. A certain complexity characterizes this relationship, which is influenced by the type and number of cyberbullying roles, type of substance used, gender, peer influence and parent-offspring relationship. Most studies used a cross-sectional design, so it is not easy to establish a causal link between these two behaviors. Moreover, this qualitative synthesis highlights some important literature gaps. First of all, not all cyberbullying roles were equally explored, and the same is true regarding the types of substance analyzed. Besides, there is a lack of information regarding different patterns of substance use, e.g. problematic or frequent use. Several studies, although they controlled for possible confounding factors, did not investigate the influential mediating role of the relationship of age or socio-economical, interpersonal, or psychological variables. Further research is needed to fill the gaps in the literature that have emerged through this systematic review.

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Declarations

Conflicts of interest The authors report no conflict of interests.

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