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Cannabis use is associated with increased risk of violence: A systematic review and meta-analysis

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Review Article

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Abstract

Cannabis use is a known risk factor for adverse mental health outcomes, including psychosis, which is frequently associated with aggression. However, the specific impact of cannabis use on the risk of violence remains unclear. This meta-analysis, conducted according to PRISMA guidelines, synthesized evidence from 63 peer-reviewed studies (N = 265,079) identified via MEDLINE, EMBASE, and PsycINFO searches up to November 2024 to clarify the link between cannabis use and violence, either as a perpetrator or as a victim. Random-effects models revealed that cannabis users are at a significantly higher risk of perpetrating violent acts. This association was observed in both psychiatric patients (OR 2.49, 95% CI 1.72–3.61) and the general population (OR 2.05, 95% CI 1.74–2.41), and remained significant across both longitudinal (OR 1.17, 95% CI 1.07–1.28) and cross-sectional (OR 2.37, 95% CI 1.66–3.40) study designs. There was an especially large effect for violence involving a criminal conviction in both general (OR 3.75, 95% CI 2.54–5.53) and psychiatric (OR 4.21, 95% CI 2.86–6.22) populations. Furthermore, cannabis use was significantly associated with an increased risk of becoming a victim of violence (OR 1.49, 95% CI 1.38–1.60), a risk more pronounced in females and mixed-gender cohorts compared to males. This meta-analysis indicates an increased risk of violence, especially that resulting in a criminal conviction, among cannabis users. It also highlights the potential of cannabis use as a target for interventions to decrease violence, and underscores the need for routine assessment of cannabis use among psychiatric patients.

Introduction

There is a global trend toward a more lenient approach to cannabis use, with an increasing push for commercialization and legal sales (Murray & Hall, 2020). In the United States, twenty-four states, three territories, and the District of Columbia have legalized marijuana for recreational use among adults ("State Cannabis Policy Enactment Database," 2024). Beyond the United States, Uruguay and Canada legalized non-medical cannabis nationally in 2013 and 2018, respectively, and several European countries have since followed, including Malta, Luxembourg, and Germany, while medical cannabis is now permitted in a far larger number of jurisdictions. Alongside these regulatory changes, global prevalence of cannabis use has continued to rise. Cannabis potency has also increased substantially, with tetrahydrocannabinol (THC) concentrations in herbal cannabis and resin rising markedly over recent decades, and use of higher-potency products has been associated with increased risks of psychosis and cannabis use disorder (Chandra et al., 2019; Di Forti et al., 2019; Freeman et al., 2021; Petrilli et al., 2022). The World Drug Report for 2023 revealed that an estimated 219 million people worldwide were habitual cannabis users, making it the most commonly used substance after alcohol and tobacco ("World Drug Report 2023," 2023). Consequently, the increasing use of cannabis together with the production of high-potency forms of the drug has become a significant public health concern. It is well established that cannabis consumption leads to impairment in attention, motivation, and memory (Ranganathan & D'Souza, 2006). Its use has been linked to an increased risk of motor vehicle accidents, including fatal collisions (Myers, Bonar, & Bohnert, 2023). Much attention has been focused on the well-established evidence that prolonged heavy cannabis use can raise the risk of developing psychotic disorders (Di Forti et al., 2019) and that continued use worsens clinical and functional outcomes in those who have psychosis. Although the adverse effects of cannabis use on physical and mental health have been extensively investigated, considerably less attention has been directed toward harms to others, including interpersonal violence.

A possible link between cannabis use and violence has provoked much speculation in the media (e.g. Granger, 2025; "Marijuana Harmless?," 2025) and has increasingly attracted

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academic attention, including in systematic reviews and broader work examining cannabis-related harms and their public health implications (Finn, Murray, Stuyt, & Randall, 2026; Fischer, Daldegan-Bueno, & Reuter, 2021; Fischer, Lindner, Jutras-Aswad, & Hall, 2023). Previous systematic reviews have examined this association in specific populations, including patients with severe mental illness (Dellazizzo et al., 2019) and broader samples of adolescents and adults (Zhong, Yu, & Fazel, 2020). However, important uncertainties remain regarding the magnitude and consistency of the association across different populations and violent outcomes. Schizophrenia and other psychotic disorders have known associations with violent behaviors (Fazel et al., 2009); however, it appears that much of the elevated risk is mediated by comorbid substance abuse. For example, in England and Wales, substance misuse was common among individuals with schizophrenia who committed homicide, with cannabis among the most frequently reported substances (Appleby et al., 2023).

Although previous systematic reviews have examined the association between cannabis use and violence in selected populations, there has been no comprehensive systematic review and meta-analysis synthesizing evidence across both the general population and patients with severe mental illness while considering both perpetration and victimization. Therefore, we conducted a comprehensive systematic review and meta-analysis to examine the association between cannabis use and involvement in violent events. We specifically focused on two groups: cannabis users (a) within the general population, and (b) among patients with severe mental illness. Recognizing the intricate interplay between cannabis use and violent outcomes, we also investigated potential sources of heterogeneity among studies, including differences in study design. In essence, this study seeks to shed light on whether, and to what extent, cannabis use is linked to occurrences of violence.

Methods

Search strategy and selection criteria

The PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) standards were applied to this systematic review and meta-analysis (the checklists are provided in the Supplementary eTable 1) (Deshpande et al., 2013). The review was registered at PROSPERO in March 2021 under the protocol number CRD4202 1240658.

Data search was conducted and subsequently updated following additional searches in MEDLINE, EMBASE, and PsycINFO through the Ovid platform for articles published from the inception of each database to November 2024. We searched Medical Subject Headings (MeSH) and keywords related to: (1) violence; (2) cannabis use, connected using the Boolean operators (full list of search terms provided in Supplementary Material – Search Terms).

Inclusion and exclusion criteria

Studies were included if they satisfied the following criteria: (1) were performed in humans both from the general population and from clinical samples including all forms of clinical diagnoses (Population); (2) measured cannabis use in any form, studies were eligible if they reported any cannabis use prior to the violent outcome (Intervention/risk factor), see eAppendix 2.1 for a detailed description; (3) either as a perpetrator or as a victim of a violent act against or in comparison with non-users within the same population (Comparison); (4) examined the relationship between cannabis use and subsequent episodes of violence (Outcome), including physical, sexual, or psychological violence as defined by the original study, where multiple violent outcomes were reported, the most severe available outcome was extracted (see eAppendix 2.2 for further details on definition of outcome); and (5) published in English language. Studies were classified as involving the general population when participants were recruited from community or population-based samples, and as clinical populations when participants were recruited from psychiatric or other clinical settings with a diagnosed mental disorder. Studies reporting violence perpetration and victimization separately contributed to the corresponding meta-analysis for each outcome.

Studies were excluded if the reported exposure included cannabis combined with other substance use (e.g., alcohol, amphetamines). We excluded from quantitative analyses any overlapping samples, prioritizing the larger sample or more recent study. Non-original and peer-reviewed research (conference abstracts, reviews, grey literature, etc.) were also excluded. Eligible studies were excluded from the quantitative synthesis if data for effect size calculation were unavailable or the reported outcomes could not be harmonized across studies. Detailed reasons for exclusion are provided in Supplementary eTable 6.

Screening, quality assessment and data extraction procedures

Titles and abstracts, and subsequently selected eligible full texts of articles, were screened independently by three reviewers (PM, MG, and GT); title and abstract discrepancies were resolved through discussion at a team meeting; full-text discrepancies were screened by a third independent reviewer (EV). A cross-reference search extracted title/abstract from identified relevant reviews on the same topic, and a full-text check of potentially eligible studies from the references cited in these reviews was performed by three authors (PM, MG, and GT). Quality assessment was carried out using the Newcastle–Ottawa Scale by three independent reviewers (PM, MG, and GT) (Luchini, Stubbs, Solmi, & Veronese, 2017). Details on the instrument items and quality assessment procedures can be found in the Supplementary Material. The agreed quality grades of each study are presented in Supplementary eTable3 (Supplementary Material). Studies were awarded a maximum of nine points on items related to the selection of the cohort/cases, comparability of exposed and non-exposed groups, ascertainment of exposure and outcome, and adequacy of follow-up.

Data analysis

Pooled data were presented as ORs and 95% CIs to show the association between cannabis use and risk of being a perpetrator or victim of violence. When results were given separately between men and women, individual effect sizes were pooled into a single estimate per study. Given the substantial differences in the studied populations, we performed separate meta-analyses of studies in the general population from studies in clinical samples. Similarly, based on the outcomes, we examined separately studies measuring the effect of cannabis on being a perpetrator versus being a victim of violent acts. All analyses were conducted using Stata 16.0 (StataCorp, TX, USA).

Due to fundamental differences in study design, high heterogeneity was anticipated and assessed using the I^2 test (Higgins & Thompson, 2002). According to others (Higgins, Thompson, Deeks, & Altman, 2003), we considered an I^2 value below 50% as low, 50% – 75% as moderate, > 75% as high, and we used random-effects models

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to estimate pooled effects. To investigate potential sources of heterogeneity, subgroup analyses were undertaken according to gender, type of violence, source of reported violence, and population (i.e., general or psychiatric population).

To assess publication bias, we examined funnel plot asymmetry, applied Duval's trim-and-fill method to estimate potential unpublished studies with negative results, and conducted Egger's test ($p < 0.05$ might indicate potential publication bias) (Harbord, Egger, & Sterne, 2006; Rothstein, Sutton, & Borenstein, 2006). These analyses were also restricted to studies rated at least "fair" quality to minimize the influence of low-quality data.

We conducted sensitivity analyses stratifying studies based on quality assessment, design, and whether unadjusted or adjusted OR was provided.

Results

From the initial search, we identified 7539 studies. 113 met the inclusion criteria for qualitative synthesis, and 63 of these were included in the quantitative meta-analysis. Reasons for the exclusion of 50 studies from the quantitative analysis included: (i) lack of data to calculate ORs when these were not provided, and (ii) duplication or overlap of samples. Figure 1 summarizes the flow chart of the study selection.

Among the 64 studies included in meta-analyses (one study included two independent samples, resulting in 64 total samples from 63 unique studies): 46 were cross sectional and 17 were prospective; 50 explored associations in the general population, and 13 looked at psychiatric samples. In our quality assessment, 13 of the 63 studies (20.6%) were rated as "good," 45 (71.4%) as "fair," and 5 (7.9%) as "poor"; detailed ratings are provided in Supplementary Material (Supplementary eTable3). Out of the 77 reported effects (some studies examined both being perpetrator and victim of violence), 47 examined the association of cannabis with being a perpetrator; and 30 with being a victim of violence.

Characteristics of included studies are provided in Table 1 and Supplementary Material (Supplementary eTable4). Main analyses were conducted on 47 studies showing associations between

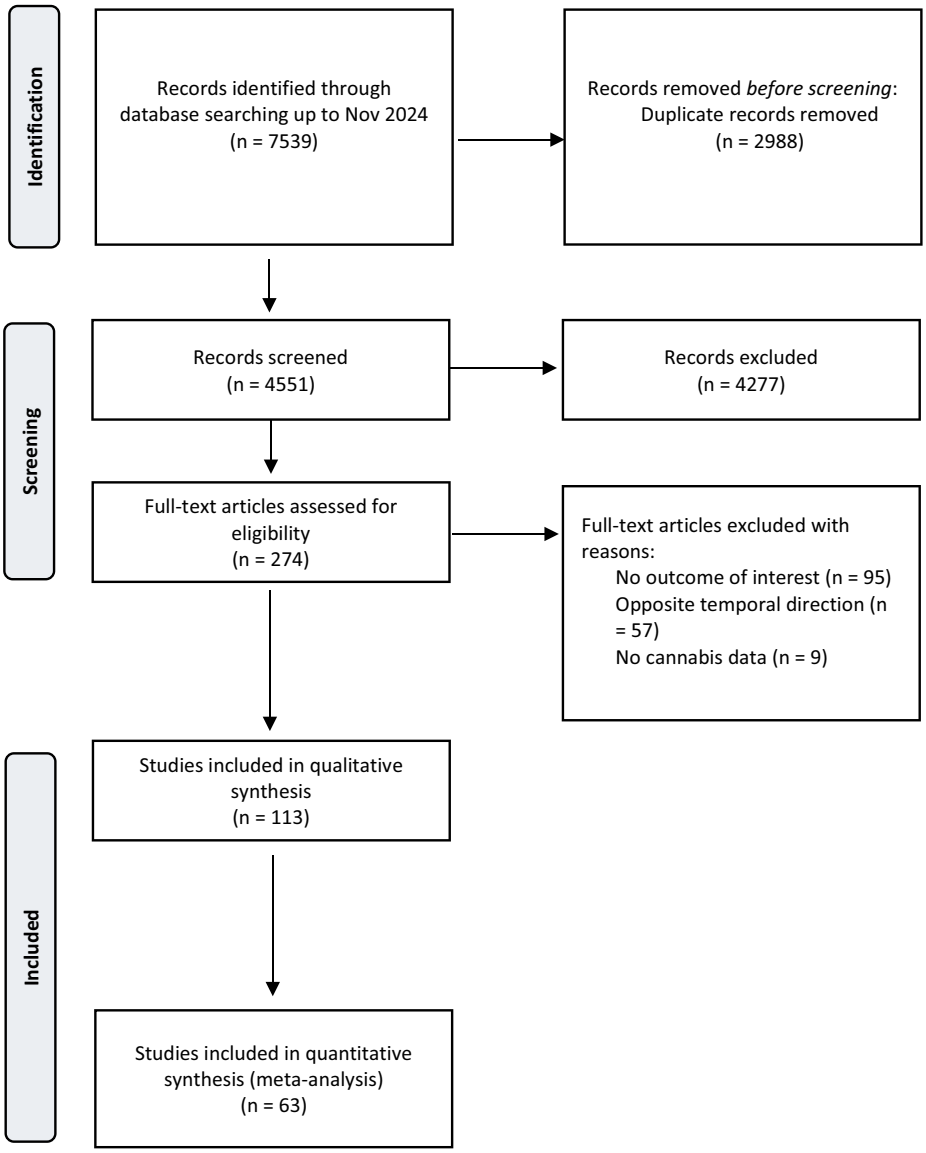


Figure 1. Flow chart of included studies for qualitative and quantitative analyses. *Note*: Flow diagram of database search by November 2024.

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Table 1. List of studies by prediction of being perpetrator or victim included for meta-analyses

References	Cohort name, and/or country	Study design	Sample size	Age range (M age)	F %	Population	Victims/ perpetrators/ both	Cannabis use assessment	Outcome assessment, type of violence
Afifi, Henriksen, Asmundson, & Sareen (2012)	Canada	Cross-sectional	25778	>20	54	GP	Both	AUDADIS-IV	Short CTS, IPV
Amaro, Fried, Cabral, & Zuckerman (1990)	USA	Cross-sectional	1243	<29	100	GP	Both	Self-report	Self-report, NPV/Other/ Physical violence
Arseneault et al. (2000)	Dunedin, New Zealand	Cross-sectional	39	21	NA	SSD	Perpetrators	SRDI	NYS questionnaire, NPV/Other/Physical violence
Asibey, Marjadi, & Conroy (2023)	ETHOS, Ghana	Cross-sectional	158	>18	49%	GP	Victims	ASSIST	GLSS, Physical Violence
Beaudoin et al. (2020)	CATIE, Canada	Longitudinal	965	18–67 (41.06)	27.7	SCZ	Perpetrators	GCSI	MACVI, NPV/Other/Physical violence
Blitstein et al. (2005)	TEENS, USA	Cross-sectional	2335	11.8–14.5 (12.74)	50.7	GP	Perpetrators	MF questionnaire	Original questionnaire, NPV/Other/Physical violence
Brook, Lee, Finch, & Brook (2014)	HLDS, USA	Cross-sectional	546	14–32 (29.1)	61.4	GP	Perpetrators	Self-report	Self-report, NPV/Other/ Physical violence
Butters, Mann, & Smart (2006)	CAMH, Canada	Cross-sectional	1766	>18	50	GP	Both	Self-report	RRI, NPV/Other/Physical violence
Caamano-Isorna et al. (2021)	SFS, USA	Longitudinal	5170	>18	60.2	GP	Victims	SAMHS questionnaire	LEC, NPV/Other/Physical violence
Caldentey et al. (2017)	Spain	Cross-sectional	46	>18 (46.6)	100	GP	Victims	Original questionnaire	CAS and HITS questionnaire, IPV
Carabellese et al. (2013)	Italy	Cross-sectional	1582	>18 (45.6)	51	Mood disorder 41.2% Psychotic disorder 27.3% Anxiety spectrum disorder 17.6% Mental retardation 4.3% Personality disorder 2.9% Dementia 1.9% Substance abuse 3.9% Others 0.9%	Perpetrators	Clinical questionnaire	Clinical questionnaire, IPV
Crane, Oberleitner, Devine, & Easton (2014)	CSUE, USA	Cross-sectional	1584	18–71 (31.4)	18.6	GP	Perpetrators	SCID	CTS-2, IPV
Cunningham et al. (2009)	FYI-1, USA	Cross-sectional	10744	19–60 (36.4)	56	GP	Both	SAOM	Adapted PVS, NPV/Other/ Physical violence
Cunradi, Caetano, Ponicki, & Alter (2021)	USA	Cross-sectional	518	18–50 (35.38)	53	Patients	Both	Self-report	CTS-2, IPV
Cunradi, Caetano, Alter, & Ponicki (2022)	USA	Cross-sectional	1037	18–50	53	GP	Both	Self-report	Revised Conflict Tactics Scale, IPV

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Table 1. (*Continued*)

References	Cohort name, and/or country	Study design	Sample size	Age range (M age)	F %	Population	Victims/ perpetrators/ both	Cannabis use assessment	Outcome assessment, type of violence
Dan-Glauser et al. (2023)	Switzerland	Longitudinal	240	18–35 (23.91)	32.5	Patients	Perpetrators	CMRS	CMs/Collateral from carers/ SOAS-R, NPV/Other/ Physical violence
Dawson et al. (2018)	USA	Cross-sectional	251	>18	56.97	GP	Perpetrators	REDCap	REDCap, NPV/Other/ Physical violence
Dim & Elabor-Idemudia (2024)	Statistics Canada, CANADA	Cross-sectional	26456	>15	50.6	GP	Both	Self-report	CTS, IPV
de Araújo Lima et al. (2021)	Brazil	Cross-sectional	369	20–59 (33)	100	GP	Victims	Self-report	CTS-2, IPV
Dharmawardene & Menkes (2017)	New Zealand	Cross-sectional	141	18–68 (38.2)	37.6	SCZ 39.7% SZA 23.4%	Perpetrators	CUDIT-R	Clinical interview, NPV/Other/Physical violence
Dugré et al. (2017)	MAVRAS, Canada	Longitudinal	1136	18–40 (29.74)	41.3	SSD 21.6% SUD 23.9% PD 1.8%	Perpetrators	Self-report	MACVI, NPV/Other/Physical violence
Dukarm et al. (1996)	YRBS 1991, USA	Cross-sectional	12267	14–18	51.2	GP	Perpetrators	Self-report	Self-report, NPV/Other/ Physical violence
Elkington et al. (2015)	NWJP, USA	Longitudinal	1487	>10	36.4	GP	Perpetrators	Self-report	Self-report, NPV/Other/ Physical violence
Fredericksen et al. (2024)	CNICS, USA	Cross-sectional	211	33–52	NA	GP	Victims	ASSIST	IPV-4, IPV
Galano et al. (2023)	USA	Cross-sectional	665	18–25 (21.6)	31.6	GP	Perpetrators	Self-report	Adapted CTS-2, NPV
Ghossoub et al. (2022)	NSDUH, USA	Cross-sectional	14027	>18	31.4	GP	Perpetrators	NSDUH diagnostic algorithm	NSDUH questionnaire, Other/Physical violence
Grest, Amaro, & Unger (2018)	RED Project, USA	Longitudinal	823	13–25 (22.73)	58.1	GP	Both	YRBS	CTSSF, IPV
Guimarães et al. (2017)	Brazil	Cross-sectional	274	>18 (32.6)	15.7	GP	Perpetrators	Self-report	Self-report, NPV/Other/ Physical violence
Haggård-Grann, Hallqvist, Långström, & Möller (2006)	Sweden	Cross-sectional	133	17–76 (35.5)	11.3	GP	Perpetrators	Original questionnaire	National reg, NPV/Other/ Physical violence
Harris et al. (2010)	Australia	Cross-sectional	85	13–25 (18.5)	34.9	FEPp	Perpetrators	Self-report	ABQ, NPV/Other/Physical violence
Huas, Hassler, & Choquet (2008)	ESPAD, France	Cross-sectional	13276	12–19 (16.9)	NA	GP	Perpetrators	Self-report	ESPAD questionnaire, NPV/Other/Physical violence
Kraanen, Vedel, Scholing, & Emmelkamp (2014)	The Netherlands	Cross-sectional	1797	>18 (25.46)	40.5	GP	Both	MATE	J-IPV, IPV

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Table 1. (*Continued*)

References	Cohort name, and/or country	Study design	Sample size	Age range (M age)	F %	Population	Victims/ perpetrators/ both	Cannabis use assessment	Outcome assessment, type of violence
Krakowski et al. (2016)	USA	Cross-sectional	118	>18	NA	SCZ	Perpetrators	SCID	LHA, NPV/Other/Physical violence
Kylie Lee, Sukavatvibul, & Conigrave (2015)	Australia	Cross-sectional	264	14–42 (27)	41.4	GP	Victims	Self-report	Local reg, NPV/Other/ Physical violence
Lamsma, Cahn, & Fazel (2020)	GROUP, The Netherlands	Cross-sectional	701	16–50	23	SSD	Perpetrators	CIDI-SAM	LCS, NPV/Other/Physical violence
Lamsma, Cahn, & Fazel (2020)	NEDEN, The Netherlands	Cross-sectional	642	14–35	31	FEPp	Perpetrators	Original questionnaire	AOQ, NPV/Other/Physical violence
Leal (2024)	NSDUH, USA	Cross-sectional	45906	>18	49	GP	Perpetrators	Self-report	Self-report, Other/Physical violence
Lim & Lui (2016)	Add Health, USA	Longitudinal	9551	11–32 (28.1)	55.2	GP	Both	Self-report	Self-report, NPV/Other/ Physical violence
Macdonald & Wells (2001)	GSS, Canada	Cross-sectional	8861	15–24	56.7	GP	Victims	Self-report	Self-report, NPV/Other/ Physical violence
Mercado-Crespo et al. (2013)	YRBS 2007, USA	Cross-sectional	12404	Dec-18	51	GP	Perpetrators	YRBS	YRBS, NPV/Other/Physical violence
Messman-Moore, Coates, Gaffey, & Johnson (2008)	USA	Cross-sectional	276	18–22 (19.18)	100	GP	Victims	Adapted DHQ	Adapted SES, DV
Miettunen et al. (2014)	NFBC, Finland	Longitudinal	4526	15–20	52	GP	Perpetrators	Self-report	National reg, NPV/Other/ Physical violence
Morojele & Brook (2006)	South Africa	Cross-sectional	1474	12–17 (14.68)	54.5	GP	Victims	Original questionnaire	Original questionnaire, NPV/Other/Physical violence
Moulin et al. (2018)	TEIPP, Switzerland	Longitudinal	240	18–35 (23.91)	32.5	EP	Perpetrators	CMRS	National reg, NPV/Other/ Physical violence
Park et al. (2019)	REAP-AP, Republic of Korea	Cross-sectional	1888	NA (39.4)	41.5	SCZ	Perpetrators	Self-report	NA, NPV/Other/Physical violence
Patton, Katafiasz, Finney, & Tadros (2020)	TTDVAB, USA	Cross-sectional	1498	12–18 (15.71)	54.8	GP	Both	Original questionnaire	Original questionnaire, DV
Pedersen & Skardhamar (2010)	YNLS, Norway	Longitudinal	1353	13–27	NA	GP	Perpetrators	Self-report	National reg, NPV/Other/ Physical violence
Porta, Mathiason, Lust, & Eisenberg (2017)	CSHS, USA	Cross-sectional	6548	18–24	61.7	GP	Both	Self-report	Self-report, IPV
Rolin et al. (2019)	OneTrackNY, USA	Cross-sectional	366	18–30 (20.7)	27.1	ENAp	Perpetrators	Self-report	Self-report, NPV/Other/ Physical violence

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Table 1. (*Continued*)

References	Cohort name, and/or country	Study design	Sample size	Age range (M age)	F %	Population	Victims/ perpetrators/ both	Cannabis use assessment	Outcome assessment, type of violence
Rusow et al. (2024)	HYMS, USA	Cross-sectional	414	18–27 (24.06)	0	GP	Both	Self-report	Self-report, IPV
Schoeler et al. (2016)	CSDD, UK	Cross-sectional	332	10–56	0	GP	Both	Self-report	National reg, NPV/Other/ Physical violence
Silva, Soares, & De Oliveira (2014)	Brazil	Cross-sectional	2207	13–18 (16.03)	62.1	GP	Perpetrators	YRBS	YRBS, NPV/Other/Physical violence
Smith et al. (2014)	USA	Longitudinal	1268	>18 (27.7)	50	GP	Both	Self-report	CTS-2, IPV
Sousa et al. (2010)	Portugal	Cross-sectional	7511	15–19	56.5	GP	Victims	Self-report	Self-report, NPV/Other/ Physical violence
Stults, Javdani, Kapadia, & Halkitis (2021)	P18, USA	Cross-sectional	526	18–19 (18.5)	0	GP	Both	TLFB	Self-report, IPV
Sujan et al. (2023)	USA	Cross-sectional	405	>18	100	GP	Victims	Self-report, urine test	Self-report, IPV
Testa, Livingston, & Leonard (2003)	Women 2000, USA	Longitudinal	1014	18–30 (24.06)	100	GP	Victims	Original questionnaire	CTS-2, IPV
Lu et al. (2018)	TDDS, Belgium	Cross-sectional	466	16–22 (17.82)	71	GP	Victims	Adapted YRBS	Adapted YRBS, DV
Vigil, Stith, & Chanel (2022)	USA	Cross-sectional	146	18–25 (18.9)	NA	GP	Perpetrators	Self-report, urine test	Aggression Questionnaire, Other/Physical violence
Volkow et al. (2024)	NSDUH, USA	Cross-sectional	23235	18–34		GP	Perpetrators	Self-report	Self-report, Other/Physical violence
Walton et al. (2009)	FYI-1, USA	Cross-sectional	849	14–18	NA	GP	Perpetrators	Self-report	CTS, DV
Whitton, Welge, & Newcomb (2023)	FAB400, USA	Longitudinal	52	16–20,	74.3	GP	Both	CUDIT-R	SGM- CTS2, IPV
Whitton, Swann, & Newcomb (2024)	SGM-AFAB, USA	Longitudinal	367	16–31	100	GP	Victims		IPV
Yan et al. (2010)	USA	Cross-sectional	316	11–13 (12.4)	52.8	GP	Both	Adapted YRBS	Adapted YRBS, DV

Note: GP, general population; SCZ, schizophrenia; SZA, schizoaffective disorder; SSD, schizophrenia spectrum disorders; FEPp, first-episode psychosis patients; ENAp, early non-affective psychosis; EP, early psychosis; SUD, substance use disorder; PD, personality disorder; NA, not available; IPV, intimate partner violence; DV, domestic violence; NPV, non-partner violence.
Cannabis use assessment tools: AUDADIS-IV, Alcohol Use Disorder and Associated Disabilities Interview Schedule-IV; ASSIST, Alcohol, Smoking and Substance Involvement Screening Test; CUDIT-R, Cannabis Use Disorders Identification Test-Revised; CIDI-SAM, Composite International Diagnostic Interview – Substance Abuse Module; SCID, Structured Clinical Interview for DSM; TLFB, Timeline Follow-Back; YRBS, Youth Risk Behavior Survey; NSDUH, National Survey on Drug Use and Health; CMR, clinician-rated measures; GCSI, Global Cannabis Severity Index; SRDI, self-reported drug involvement; MATE, Measurements in the Addictions for Triage and Evaluation; SAOM, self-administered outcome measure; REDCap, Research Electronic Data Capture.
Outcome assessment tools: CTS/CTS-2, Conflict Tactics Scale (revised versions where specified); HITS, Hurt, Insult, Threaten, Scream; CAS, Composite Abuse Scale; LEC, Life Events Checklist; SOAS-R, Staff Observation Aggression Scale-Revised; LHA, Life History of Aggression; ABQ, Aggression Behavior Questionnaire; SES, Sexual Experiences Survey; MACVI, measure of aggression/violence (study-specific); GLSS, Ghana Living Standards Survey; national reg, national registry data; original questionnaire, non-validated study-specific instrument.

cannabis use and being a perpetrator of violence: 33 cross-sectional and 14 longitudinal; 34 on the general population and 13 on psychiatric populations. They included a total of 208,951 exposed individuals (199,660 from the general population and 9291 psychiatric patients). For the association between having used cannabis and being a victim of violence, we included 22 cross-sectional and 8 longitudinal general population studies (86510 exposed).

Among individuals from the general population, the combined pooled effect showed a significantly increased risk among cannabis users of being a perpetrator of violence (OR 2.05, 95% CI 1.74–2.41), with little difference when "poor" quality studies were excluded (OR 2.02, 95% CI 1.70–2.40) (Supplementary eFigure1A). The association remained significant when analyses were restricted to longitudinal studies, although the effect size was substantially smaller (OR 1.17, 95% CI 1.07–1.28) than in cross-sectional studies (OR 2.37, 95% CI 1.66–3.40) (Supplementary eFigure2). In subgroup analyses in the studies with single sex participants, we observed that the combined odds were slightly lower in males (OR 1. 51, 95% CI 1.29–1.78) than in females (OR 1.98, 95% CI 1.33–2.97) (Figure 2). The effect of cannabis on the risk of being a perpetrator was higher in studies of psychiatric patients (OR 2.49, 95% CI 1.72–3.61) than in the general population (Figure 3). The association with becoming a perpetrator within an intimate relationship or in the context of dating was lower (OR 1.22, 95% CI 1.11–1.35) than that of being a perpetrator in other contexts (OR 2.79, 95% CI 1.92–4.07) (Supplementary eFigure3). A significant risk of being a victim of violence following cannabis use was found (OR 1.49, 95% CI 1.38–1.60), in particular for females and mixed gender studies compared to males (Figure 4). This did not change if studies rated as "poor" were excluded (OR 1.46, 95% CI 1.36–1.57) (Supplementary eFigure1C). Table2 summarizes the findings of all the analyses we carried out.

In a small number of studies identifying violence as involving a criminal conviction, we found a higher effect size in both general population (OR 3.75, 95%CI 2.54–5.53) and psychiatry population (OR 4.21, 95% CI 2.86–6.22) compared with self-reported violence (OR 2.02, CI 95% 1.66–2.46 for general population and OR 2.18, 95% CI 1.51–3.14 for psychiatric) (Supplementary eFigures 4 and 5). Further analyses were run to test for differences between unadjusted and adjusted ORs, with very similar estimates (adjusted OR 2.01, 95% CI 1.40–2.89; unadjusted OR 2.19, 95% CI 1.68–2.85) (Supplementary eFigures 6 and 7).

We included twenty-one cross-sectional and eight longitudinal general population studies (84395 exposed), which explored the association between having used cannabis and being a victim of violence. The combined pooled effect from the random-effects meta-analyses showed a slightly increased risk of being a victim of violence (OR 1.49, 95% CI 1.38–1.60); this did not change if studies rated as "poor" were excluded (OR 1.46, 95% CI 1.36–1.57) (Supplementary eFigure1C).

In subgroup analyses by gender, females using cannabis (OR 1.60, 95% CI 1.37–1.88) were more at risk of being a victim of violence than males (OR 1.30, 95% CI 1.14–1.48) (Figure 4). The risk of being a victim was less likely within an intimate relationship or in the context of dating (OR 1.39, 95% CI 1.28–1.51) than in other relational contexts (OR 1.88, 95% CI 1.44–2.45) (Supplementary eFigure8).

The subgroup analyses on study design in victims of violence showed a smaller pooled effect from longitudinal studies (OR 1.05, 95% CI 1.01–1.10) than from cross-sectional studies (OR 2.20, 95% CI 1. 80–2.68) (Supplementary eFigure9). We could not explore differences based on the source of information on reported violence, but the results showed small variation based on utilized effect size (unadjusted or adjusted OR) (Supplementary eFigure10).

The asymmetrical distribution of the funnel plots, both for perpetrators and victims, raises the possibility of publication bias or other small-study effects (Supplementary eFigures 12–20), which was confirmed by significant Egger regression tests ($p < 0.001$). The trim-and-fill method was used to correct for publication bias, yielding a similar overall effect size compared to the uncorrected for perpetrators in the general population (OR 2.12, 95% CI 1.68–2.69) but somewhat lower in the psychiatric population (OR 1.85, 95% CI 1.37–2.51) and for victims (OR 1.52, 95% CI 1.17–1.98). Further analysis demonstrated how these biases may differentially impact the results based on the study design and the source of information. Specifically, pooled results from cross-sectional studies of offenders remained the same (OR 2.39, 95% CI 1.86–3.01), whereas corrected results from longitudinal studies appeared reduced (OR 1.5, 95% CI 1.01–2.26). This extended to the source of information, with significant but reduced findings in offenders based on criminal records (OR 3.51, 95% CI 2.41–5.12) but unchanged in self-reported violence (OR 2.02, 95% CI 1.59–2.58).

Discussion and conclusions

We carried out a systematic review and meta-analysis, including a total of 63 studies, to explore the association between cannabis use and violent events, both as perpetrators and victims, in two distinct populations: (a) cannabis users in the general population and (b) patients with severe mental illness.

Overall, our findings show an increased risk of carrying out interpersonal violence, including severe types of violence such as aggravated assault, sexual aggression, fighting, and robbery, in cannabis users. The high effect size for convictions of violence among cannabis users is of particular importance given the severity of this violence and the likely greater reliability of these data than self-report.

Possible explanations for the association between cannabis use, particularly high doses, and violence include impairments in attention, executive function, inhibition, and problem-solving abilities (Crean et al., 2011). Prolonged heavy use can also influence mood and emotional regulation, including feelings of anger and hostility (Gruber, Rogowska, & Yurgelun-Todd, 2009). Moreover, during periods of cannabis withdrawal, individuals may experience irritability, anxiety, restlessness, and impaired functioning, potentially leading to aggressiveness (Connor et al., 2022). Most importantly, regular cannabis use increases the likelihood of experiencing paranoia, causing individuals to interpret neutral stimuli as potentially threatening, leading individuals to believe that they must defend themselves (Freeman et al., 2015). In addition, cannabis users tend to exhibit higher levels of impulsivity and engage in more risk-taking behaviors, which could lead to antisocial and criminal activities as part of their lifestyle (Moeller & Dougherty, 2002). These mechanisms represent only one component of the broader relationship between drugs and violence, which has also been conceptualized as involving psycho-pharmacological, economic-compulsive and systemic pathways (Goldstein, 1985). However, these psycho-pharmacological mechanisms are unlikely to fully explain the observed association. Cannabis use frequently co-occurs with a range of individual, social and environmental factors, including impulsivity, antisocial traits, adverse socioeconomic circumstances and exposure to violent environments, that may independently contribute to violence risk. The available evidence therefore suggests that the association between cannabis use

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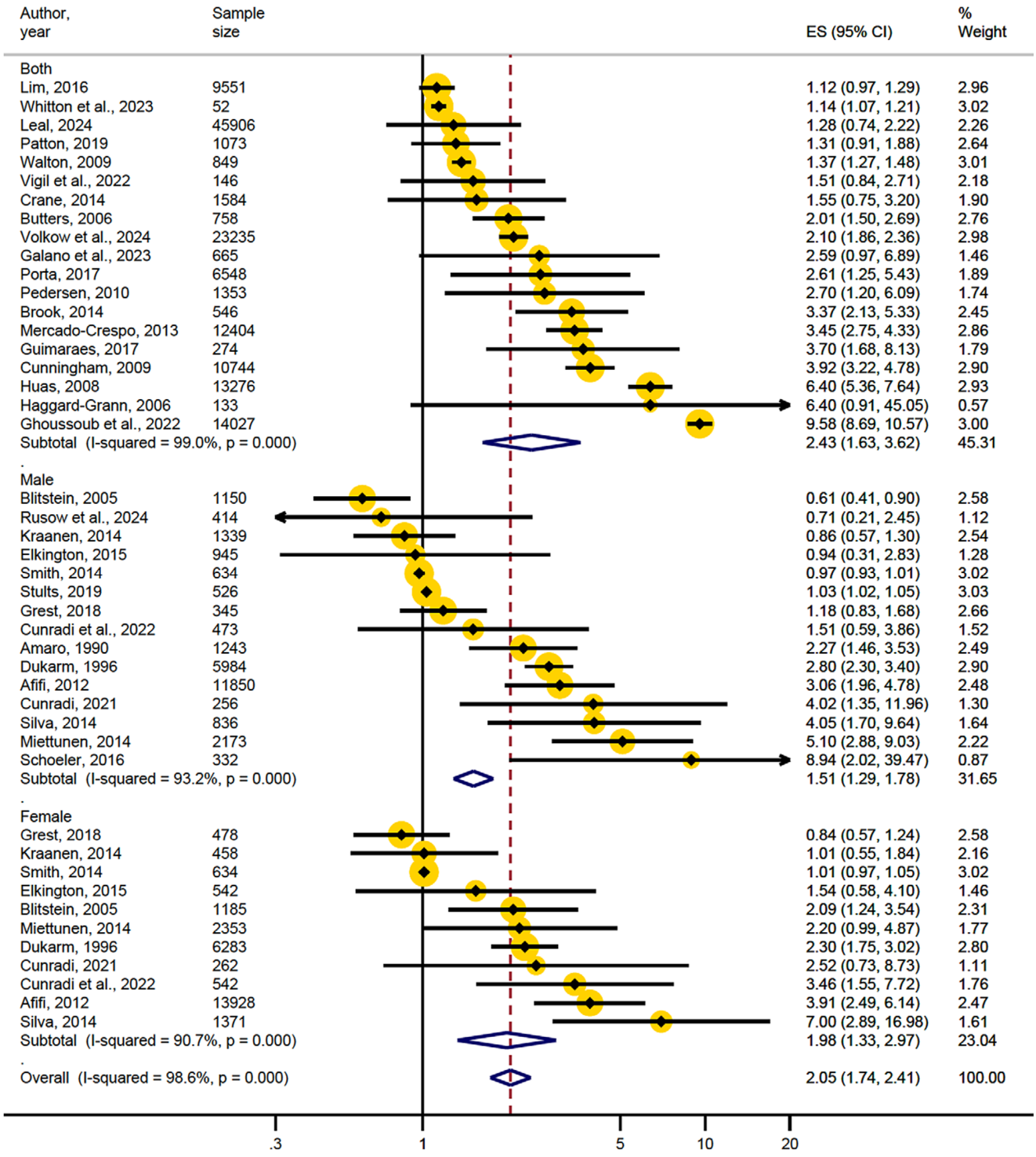


Figure 2. Forest plot – Perpetrator in the general population by gender. The yellow circles represent the point estimates of the effect sizes, with the size of each circle proportional to the study's weight in the meta-analysis. The horizontal bars extending from each circle depict the 95% confidence intervals. A narrower bar signifies a more precise estimate. The term 'Both' refers to studies that included participants of all genders, without differentiating between male and female data in the analysis. The diamonds represent the pooled effect size for each subgroup and the overall effect size, integrating the data from all included studies. *Note*: Forest plot of the association between cannabis use and violence grouped by gender.

and violence is likely to reflect multiple interacting pathways rather than a single direct causal mechanism.

The risk of violence appears to be higher among psychiatric patients, corroborating the findings from an earlier meta-analysis (Dellazizzo et al., 2019). In people with psychosis, continued cannabis use leads to poorer clinical outcomes, contributing to a higher risk of relapse, persistent positive symptoms, poor treatment adherence, and treatment resistance (Patel et al., 2016). These factors could increase risk for violence. In addition, socioeconomic and personality factors may also play a role. Cannabis users often

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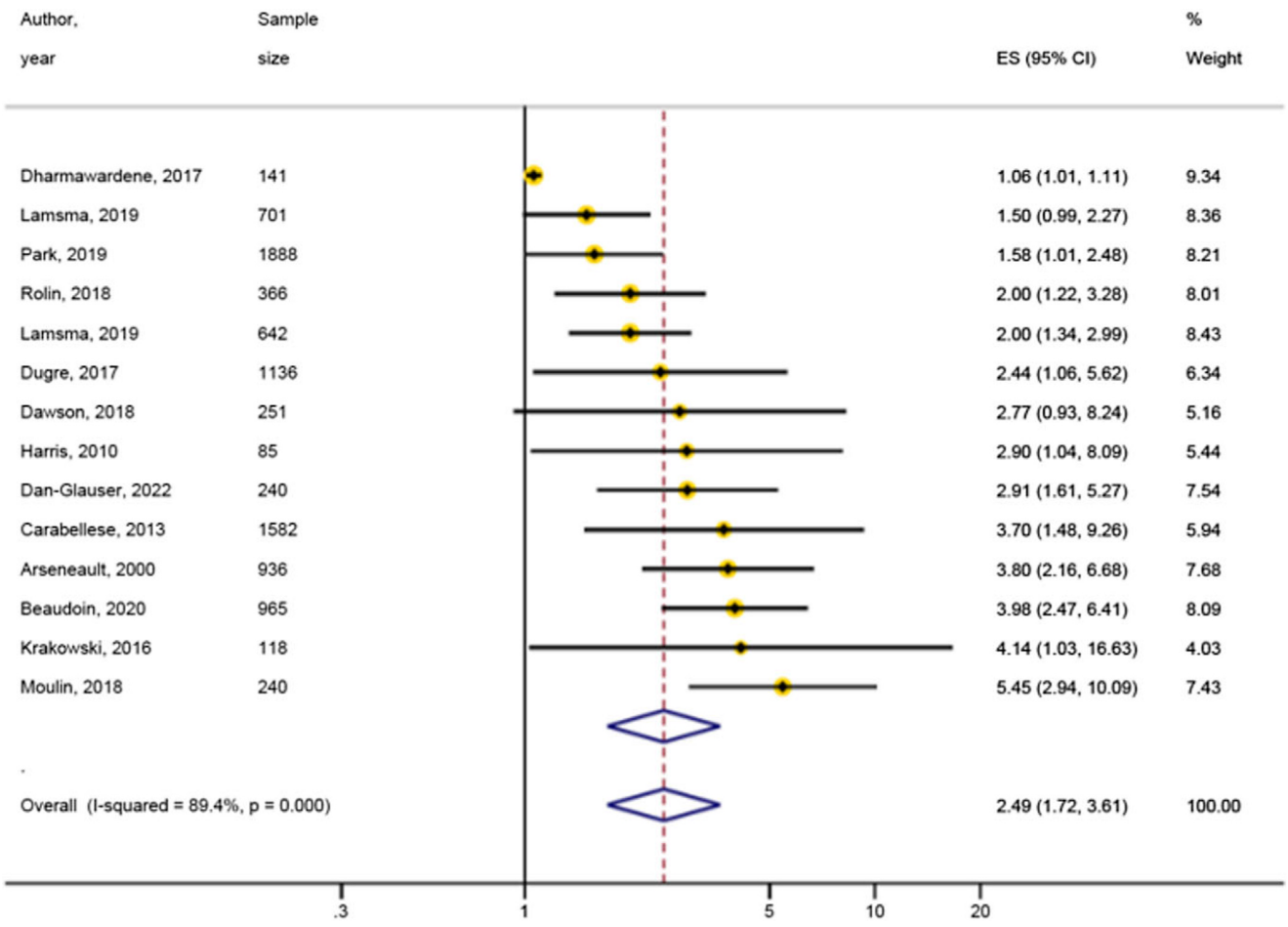


Figure 3. Forest plot – Perpetrator in Psychiatric Population in both genders. The yellow circles represent the point estimates of the effect sizes, with the size of each circle proportional to the study's weight in the meta-analysis. The horizontal bars extending from each circle depict the 95% confidence intervals. A narrower bar signifies a more precise estimate. The diamond at the bottom represents the overall effect size, integrating the data from all included studies. *Note*: Forest plot of the association between cannabis use and violence grouped by gender.

differ from non-users in terms of social context, lifestyle, and personality characteristics. For instance, individuals with higher impulsivity and antisocial traits may be more likely both to use cannabis (particularly in settings where it is illegal) and to engage in delinquent or violent behavior. Given the higher rate of cannabis use among individuals with severe mental disorders compared to the general population, this group represents a particularly at-risk population in terms of violent behavior ("Marijuana Harmless?," 2025).

The link we found between cannabis use and victimization, although weak, may reflect increased vulnerability rather than direct causality. Cannabis users may place themselves in risky situations. They may associate with peers who engage in substance use or criminal activities, thereby increasing their exposure to violent contexts. Thus, both behavioral disinhibition and social environment may have contributed to the increased risk of victimization.

The following limitations to our study must be considered. Firstly, the studies we reviewed employed a heterogeneity of definitions used for violence (e.g., physical, sexual, intimate/non-intimate), and varying methods of reporting cannabis use (e.g., self-reported measures, validated questionnaires, and biological samples). Secondly, the included studies also differed considerably in how cannabis exposure was defined and measured (e.g., lifetime or recent use), and most lacked a detailed assessment of exposure intensity, including frequency of use, dose, duration, and THC and cannabidiol (CBD) ratio. Consequently, subgroup or dose–response analyses based on cannabis exposure intensity or potency were not feasible. Thirdly, although we excluded studies in which the effects of cannabis could not be separated from polydrug use, participants classified as cannabis users may also have used other psychoactive substances, and most included studies did not comprehensively account for concomitant substance use. Residual confounding by alcohol or other drugs therefore cannot be excluded. Fourthly, a significant number of studies were cross-sectional and retrospective in nature, making it challenging to establish a definitive chronological relationship between cannabis use and violent behavior. However, sensitivity analysis based on study design indicated that when analyzing longitudinally collected data, there was still a significant effect of cannabis use on subsequent violence. This suggests that the association between cannabis use and violence is not due to recall bias or reverse causation. Nevertheless, the substantial statistical heterogeneity observed across studies suggests that the pooled estimates should be interpreted as average effects across diverse populations, study designs, and definitions of both cannabis use and violence. A substantial proportion of eligible studies could not contribute to the pooled estimates, most often because published data were insufficient for effect size calculation.

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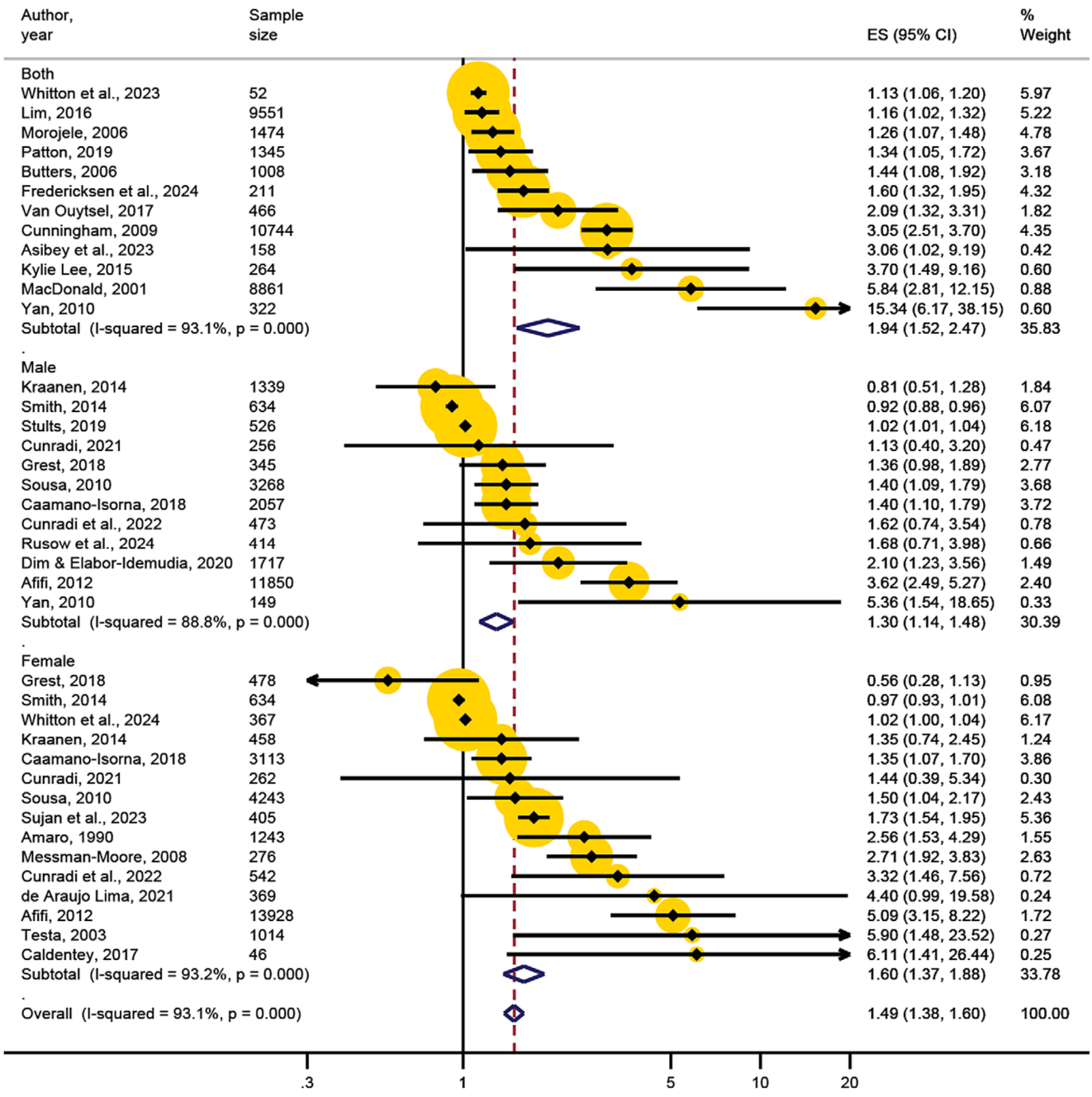


Figure 4. Forest plot – Victims in the General Population by gender. The yellow circles represent the point estimates of the effect sizes, with the size of each circle proportional to the study's weight in the meta-analysis. The horizontal bars extending from each circle depict the 95% confidence intervals. A narrower bar signifies a more precise estimate. The term 'Both' refers to studies that included participants of all genders, without differentiating between male and female data in the analysis. The diamonds represent the pooled effect size for each subgroup and the overall effect size, integrating the data from all included studies. *Note*: Forest plot of the association between cannabis use and violence grouped by gender.

This may introduce reporting bias if incomplete reporting is associated with the magnitude or direction of findings. Lastly, publication bias may have influenced the reported effect sizes. To address this limitation, we performed additional analyses using the trim-and-fill method, which imputes hypothetical "missing" studies to provide a corrected effect size. Further detailed analyses revealed that the impact of publication bias varied minimally across different study designs and sources of information, with all calculated corrected results remaining significant. Finally, our review was restricted to studies published in the English language, and therefore relevant evidence published in other languages may have been missed, introducing the potential for language bias.

The findings of our study underscore the importance of addressing this issue at both a societal and clinical level. From a public health perspective, violence should be considered alongside other established cannabis-related harms when developing prevention strategies, public education campaigns, and regulatory policies, particularly in jurisdictions where cannabis has been legalized or decriminalized. Our findings also suggest that violence should be considered within broader frameworks for assessing cannabis-related harm, as it

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Table 2. Summarising table of main analyses, subgroup analyses, and sensitivity analyses

	Number of studies	Effect size		Heterogeneity	
		OR	95% CI	I^2	p
Main analyses					
Perpetrators in the General Population	45	2.05	1.74, 2.41	98.6%	**0.000**
Perpetrators in Psychiatric Population	14	2.49	1.72, 3.61	89.4%	**0.000**
Victims in the General Population	39	1.49	1.38, 1.60	93.1%	**0.000**
Subgroup analyses					
Perpetrator in the General population – male	15	1.51	1.29, 1.78	93.2%	**0.000**
Perpetrator in the General population – female	11	1.98	1.33, 2.97	90.7%	**0.000**
Victims in the General Population – male	12	1.30	1.14, 1.48	90.7%	**0.000**
Victims in the General Population – female	15	1.60	1.37, 1.88	88.8%	**0.000**
Perpetrator in the General population – cross-sectional studies	23	2.37	1.66, 3.40	98.2%	**0.000**
Perpetrator in the General population – longitudinal studies	10	1.17	1.07, 1.28	91%	**0.000**
Perpetrator in Psychiatric population – cross-sectional studies	10	2.08	1.45, 2.99	83.9%	**0.000**
Perpetrator in Psychiatric population – longitudinal studies	4	3.71	2.73, 5.05	6.0%	0.363
Perpetrator in the General population – unadjusted odds ratios	17	2.19	1.68, 2.85	99.4%	**0.000**
Perpetrator in the General population – adjusted odds ratios	16	2.01	1.40, 2.89	96.8%	**0.000**
Perpetrator in Psychiatric population – unadjusted odds ratios	8	3.00	1.54, 5,84	91.6%	**0.000**
Perpetrator in Psychiatric population – adjusted odds ratios	6	2.01	1.55, 2.59	37.7%	0.155
Perpetrator in the General population – other type of violence	21	2.79	1.92, 4.07	97.8%	**0.000**
Perpetrator in the general population – intimate or dating type of violence	12	1.22	1.11, 1.35	92.9%	**0.000**
Perpetrator in the General population – reported criminal conviction	3	3.75	2.54, 5.53	0.0%	0.377
Perpetrator in the General population – self-reported violence	30	2.02	1.66, 2.46	99.1%	**0.000**
Perpetrator in Psychiatric population – reported criminal conviction	3	4.21	2.86, 6.22	0.0%	0.504
Perpetrator in Psychiatric population – self-reported violence	11	2.18	1.51, 3.14	86.9%	**0.000**
Victims in the General population – unadjusted odds ratios	14	1.41	1.28, 1.56	95.0%	**0.000**
Victims in the General population – adjusted odds ratios	15	1.59	1.36, 1.86	89.0%	**0.000**
Victims in the General population – cross-sectional studies	21	2.20	1.80, 2.68	86.6%	**0.000**
Victims in the General population – longitudinal studies	8	1.05	1.01, 1.10	84.5%	**0.000**
Victims in the General population – other type of violence	10	1.88	1.44, 2.45	90.5%	**0.000**
Victims in the General population – intimate or dating type of violence	19	1.39	1.28, 1.51	94.3%	**0.000**
Sensitivity analyses					
Perpetrator in the General population with at least fair quality	41	2.02	1.70, 2.40	98.7%	**0.000**
Perpetrator in Psychiatric population with at least fair quality	13	2.47	1.69, 3.62	89.9%	**0.000**
Victims in the General population with at least fair quality	38	1.46	1.36, 1.57	93.0%	**0.000**

Bold values indicate statistical significance ($P < 0.05$). Also, P values currently reported as 0.000 should be presented as $P < 0.001$.

represents a potential harm not only to the user but also to other individuals and society more broadly. At the clinical level, our findings highlight the necessity for mental health professionals to routinely assess cannabis use in individuals presenting with violent tendencies, particularly among those with severe mental illness, and to consider ongoing cannabis use as a potentially modifiable risk factor when undertaking violence risk assessment and management. This should include identifying patterns of cannabis use, discussing the potential impact of continued use on symptoms and violence risk, and supporting reduction or cessation of cannabis use as part of an integrated treatment plan. There remains a need to develop and evaluate population-specific interventions aimed at reducing cannabis use and determining whether such interventions also reduce the risk of violence.

To conclude, this meta-analysis reveals a significant association between cannabis use and increased risk of violence, especially criminal violence, in the general population and particularly among psychiatric patients. It is important to note that the majority of the

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studies we reviewed were carried out before the increased use of high-potency preparations of cannabis. Future research should prioritize prospective longitudinal studies with detailed characterization of cannabis exposure, including frequency, cumulative use and THC/CBD composition, to better disentangle causal pathways. Studies should also examine whether reducing cannabis use through clinical or public health interventions leads to reductions in violent behavior (Marconi et al., 2016).

Supplementary material. The supplementary material for this article can be found at http://doi.org/10.1017/S0033291726105856.

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During the preparation of this work, the authors used ChatGPT 4.0 and Gemini in order to improve language and readability. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the publication.

Author contributions. PM and GT performed search, screening, data extraction, and quality appraisal. Discrepancies were screened by EV. The extracted data was used for quantitative analyses, and VR was responsible for performing statistical analyses. GT, with the input of PM and VR, wrote the first draft of the manuscript. All authors provided input on the writing of the manuscript and interpretation of the data.

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Competing interests. The authors declare none.

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