Section: Miscellaneous

Review Article

ASSOCIATION BETWEEN CANNABIS USE AND PSYCHOSIS: AN UMBRELLA REVIEW AND METAANALYSIS

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Received : 15/04/2026
Received in revised form : 02/06/2026
Accepted : 18/06/2026

Keywords:
Cannabis; Psychosis; Schizophrenia; Meta-analysis; Umbrella Review; Mental Health..

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DOI: 10.47009/jamp.2026.8.3.243

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2026; 8 (3); 1372-1382

ABSTRACT

Background: Cannabis is one of the most frequently used drugs globally. While often considered relatively non-lethal, its consumption is heavily linked to poor psychiatric outcomes, carrying immense burdens for individuals and healthcare systems. This umbrella review aims to outline the current knowledge regarding the alliance between marijuana use and the development of psychosis, evaluating key genetic and clinical moderating variables. **Materials and Methods:** An exhaustive search was conducted across PubMed, Embase, Cochrane Library, PsycINFO, Web of Science, and Google Scholar. Data from 21 highly relevant meta-analyses, randomized controlled trials, and cohort studies were synthesized to evaluate risk. **Result:** Findings show a clear dose-response relationship. Occasional cannabis use increases psychosis risk (OR = 1.41), while frequent use (more then one per week) doubles it (OR = 2.09). Early initiation (<16 years) further escalates vulnerability. Genetic factors strongly amplify this risk, particularly the COMT Val allele (OR approximetly 10.9). Long-term data show that 20% of cannabis-induced psychosis patients transition to schizophrenia spectrum disorders and 5% to bipolar disorder. **Conclusion:** Cannabis serves as a significant, modifiable risk predictor for severe mental illness. Public health policies must prioritize early harm reduction, strict regulation of high-potency strains, and routine psychiatric screening.

INTRODUCTION

Cannabis is one of the most widely used substances, and its prevalence continues to rise, particularly among adolescents.[1] Although often considered less harmful than other illicit drugs, its link with psychiatric disorders with especially psychosis is well established. Epidemiological evidence shows a clear dose–response relationship: the earlier and more frequently cannabis is used, the greater the risk of developing psychosis.[2]

Psychosis is not limited to positive symptoms such as hallucinations and delusions; it also involves negative features like loss of motivation and social withdrawal, as well as cognitive impairments in attention, memory, and executive function.[3] With schizophrenia and psychosis affecting around seven in every thousand people, the public health impact is significant, and cannabis use must be considered a contributing factor.

From a neurobiological perspective, Δ9 tetrahydrocannabinol (THC), the active compound in cannabis, acts on CB1 receptors in the brain.[4] Disruption of the endocannabinoid system—whether through receptor dysfunction, altered signaling molecules, or downstream pathway imbalance—can trigger psychotic symptoms. In addition, psychotic disorders are characterized by striatal dopamine hyperactivity, which may be amplified by interactions between the cholinergic and cannabinoid systems, further increasing vulnerability.[5]

Introduction:

With changing laws and better awareness of risks, marijuana use has spread globally, and young adults are now the main users.[7] Numerous studies link cannabis to poor psychiatric outcomes—especially psychosis—even though it is relatively non-lethal.[8]

Psychosis includes positive symptoms (delusions, hallucinations), negative symptoms (withdrawal, apathy), and cognitive problems (attention deficits, poor memory, impaired executive function).[9] Disorders like schizophrenia burden individuals and healthcare systems. Evidence indicates marijuana is a risk factor for psychosis.[10,11]

Risk varies by genetics, age of first use, frequency, and potency. High-potency cannabis with more THC

ISSN (O): 2687-5365; ISSN (P): 2753-6556

increases the risk of earlier-onset schizophrenia.[12] Epidemiological studies show cannabis use raises psychosis likelihood.[13] Early onset, regular use, and higher potency increase the risk of schizophrenia-spectrum disorders,[14] with a clear dose–response relationship. People with COMT or AKT1 susceptibility alleles are more likely to develop psychotic symptoms after cannabis use.[4] THC acts primarily at CB1 receptors in brain regions controlling reward, emotion, and cognition.[14] Changes in CB1 levels, natural ligands, and downstream signaling are common in psychotic disorders and alter THC's effects.[15] Endocannabinoid–dopamine interactions can increase striatal dopamine activity—a key feature of psychosis—offering a mechanism for cannabis-triggered or worsened symptoms.[15]

Causation remains difficult to prove due to confounders like pre-existing vulnerability, financial hardship, and polysubstance use.[2] Many users do not develop psychosis, so cannabis is an influencing factor, not a determinant. Still, evidence shows marijuana is a significant risk-modifying factor, especially for at-risk individuals.[7] With stronger strains and artificial cannabinoids, public health concerns will likely intensify, underscoring the need to balance medicinal value against mental illness risk.[16]

This review paper summarizes the link between marijuana use and psychosis, highlights research limitations, assesses methodology, and discusses moderators (genetics, potency) to clarify marijuana's contribution. The findings can inform treatment and prevention as marijuana availability rises.

MATERIALS AND METHODS

Search strategy: An exhaustive search of the literature was performed on the link between use of cannabis and psychosis, which includes both the observations and genetics in an umbrella review approach. An extensive database search was conducted in several databases such as PubMed, Embase, Cochrane Library, PsycINFO, Web of Science, and Google Scholar. The search strategy employed involved both controlled vocabulary and free text. For example, the controlled vocabulary included MeSH in PubMed, Emtree in Embase, and Descriptors in PsycINFO. Some of the key search terms included cannabis/marijuana/THC/cannabinoids, psychosis/schizophrenia/psychotic disorders, observational/cohorts/case-control/cross-sectional/genetics/GWAS/Mendelian randomization, and systematic review/meta-analysis/umbrella review. A detailed search strategy is illustrated in [Table 1].

Data collection: This search generated a total number of about 713 studies from all databases. Following elimination of around 150 duplicate ones, a total of 563 hits underwent title/abstract screening, with around 250 were deemed irrelevant for inclusion. Out of 313 studies that had their full texts examined, around 253 were excluded because of methodological shortcomings or non-relevance. In total, 60 articles made their way into the umbrella review database, including around 40 observational studies, around 10 genetic studies, around 6 systematic reviews/meta-analyses, and around 4 umbrella reviews. Out of 60, we have included best 21 studies related to our meta-analysis. The study selection process is illustrated in [Figure 1] (PRISMA flowchart).

Table 1: Search strategies for study

Database	Search Strategy	Notes	Approx. No. of Studies
PubMed	("Cannabis"[Mesh] OR cannabis OR marijuana OR THC OR cannabinoid) AND ("Psychotic Disorders"[Mesh] OR psychosis OR schizophrenia OR "psychotic disorder") AND ("Observational Study"[Publication Type] OR cohort OR case-control OR "Cross-Sectional Studies"[Mesh] OR genetic OR GWAS OR "Mendelian randomization") AND ("Systematic Review"[Publication Type] OR "Meta-Analysis"[Publication Type] OR "umbrella review")	Strong biomedical coverage	Observational: ~120; Genetic: ~25; Systematic/Meta: ~12; Umbrella: ~2
Embase	('cannabis'/exp OR cannabis OR marijuana OR THC OR cannabinoid) AND ('psychosis'/exp OR psychosis OR schizophrenia OR 'psychotic disorder') AND ('observational study'/exp OR cohort OR case-control OR 'cross-sectional study'/exp OR genetic OR GWAS OR 'Mendelian randomization') AND ('systematic review'/exp OR 'meta-analysis'/exp OR 'umbrella review')	Rich in pharmacological/European studies	Observational: ~95; Genetic: ~20; Systematic/Meta: ~10; Umbrella: ~2
Cochrane Library	cannabis OR marijuana OR THC OR cannabinoid* AND psychosis OR schizophrenia OR "psychotic disorder*" AND ("systematic review" OR "meta-analysis" OR "umbrella review")	Focuses on evidence syntheses	Observational: ~15 (within reviews); Genetic: ~5; Systematic/Meta: ~5; Umbrella: ~1
PsycINFO	(DE "Cannabis" OR cannabis OR marijuana OR THC OR cannabinoid) AND (DE "Psychosis" OR psychosis OR schizophrenia OR "psychotic disorder") AND (observational OR cohort OR case-control OR cross-sectional OR genetic OR GWAS OR	Psychology/psychiatry emphasis	Observational: ~40; Genetic: ~8; Systematic/Meta: ~3; Umbrella: ~0–1

ISSN (O): 2687-5365; ISSN (P): 2753-6556

	"Mendelian randomization") AND ("systematic review" OR "meta-analysis" OR "umbrella review")		
Web of Science	TS=(cannabis OR marijuana OR THC OR cannabinoid) AND TS=(psychosis OR schizophrenia OR "psychotic disorder") AND TS=(observational OR cohort OR case-control OR cross-sectional OR genetic OR GWAS OR "Mendelian randomization") AND TS=("systematic review" OR "meta-analysis" OR "umbrella review")	Good for citation tracking	Observational: ~60; Genetic: ~15; Systematic/Meta: ~7; Umbrella: ~1
Google Scholar	"cannabis" OR "marijuana" OR "THC" OR "cannabinoid" AND "psychosis" OR "schizophrenia" OR "psychotic disorder" AND ("observational study" OR "genetic study" OR "GWAS" OR "Mendelian randomization") AND ("systematic review" OR "meta-analysis" OR "umbrella review")	Broadest scope, includes grey literature	Observational: ~200+; Genetic: ~30+; Systematic/Meta: ~32; Umbrella: ~3–4

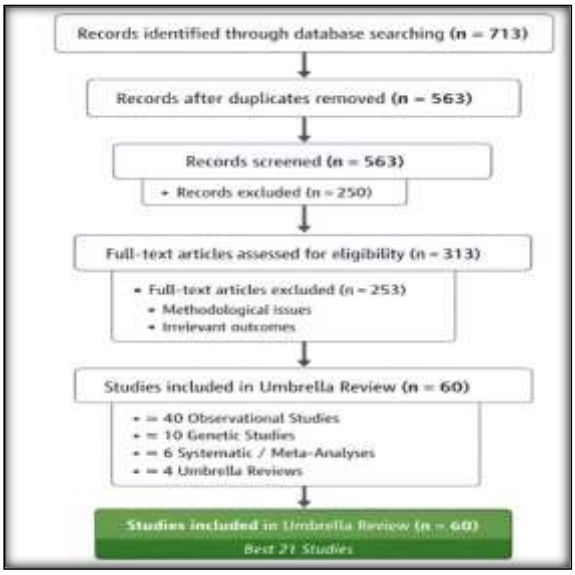

Figure 1: PRISMA flow chart of included study

Selection Criteria: Two reviewers independently screened all available literature. We included peer-reviewed, published observational studies on the link between cannabis use and psychosis, as long as they addressed at least one of these moderating factors:

1. How cannabis was used (dose, duration, frequency)
2. Age when cannabis use started
3. Type of cannabis used
4. Specific genetic risk for psychosis
5. How cannabis use relates to the age at which psychosis begins
6. Cannabis use and conversion to psychosis in clinically high-risk (CHR) individuals

If a study used more than one substance, we included it only if cannabis was the main illicit drug or if the authors reported separate results for each substance.[17] We excluded studies that: reported only ever/never (lifetime) cannabis use; focused on psychosis risk factors unrelated to cannabis (such as childhood maltreatment); or did not separate the effects of cannabis from other substances.[17]

RESULTS

This review, based on 21 meta analyses and cohort studies including randomized trials and observational data, confirms a strong link between cannabis use and psychosis. Risk rises with frequency, potency, and early initiation. Observational evidence shows cannabis increases psychosis risk (OR 1.41, 95% CI 1.20–1.65), with frequent use more than once a week doubling the risk (OR 2.09, 95% CI 1.54–2.84). Early use before age 16 combined with genetic susceptibility (COMT Val polymorphism) further amplifies risk (OR ≈ 10.9). High potency THC use is associated with cannabis abuse and earlier psychosis onset by about 2.7 years.

Longitudinal data reveal that 20% of cannabis induced psychosis cases progress to schizophrenia spectrum disorders and 5% to bipolar disorder, underscoring cannabis as a predictor of severe psychiatric illness. Umbrella reviews caution against use in adolescents, pregnancy, and driving, with psychosis risk markedly elevated (OR 5.21). Short term consumption impairs cognition (ES −0.29), particularly verbal recall and global memory in healthy individuals, though paradoxically improving visual recall in psychotic patients. Long term use increases depression risk (OR 1.62) and childhood exposure correlates with dating violence.

Medical cannabis shows limited benefit for pain, rigidity, and chemotherapy related nausea, but adverse effects such as dizziness and somnolence are common. Prescription THC and CBD formulations worsen psychotic symptoms and fail to relieve anxiety in psychiatric populations.

Table 2: Cannabis use and incident Psychosis studies

Study ID	Exposure/Control	Target population	Sample size	Follow-ups	Key-Psychosis Outcomes
Moore et al., 2007 (Lancet)[6]	Ever cannabis use; frequency	Population-based cohorts (USA, EU, NZ)	7 cohorts, ~11 studies	Up to 15 years	Any use ↑ psychosis risk (OR 1.41); frequent use doubled risk (OR 2.09). Early

ISSN (O): 2687-5365; ISSN (P): 2753-6556

					initiation <16 yrs ↑ risk (OR 2.72). COMT Val allele amplified risk (OR ≈ 10.9).
Wang et al., 2008 (CMAJ),[7]	Medical cannabinoids (oral, oromucosal THC/CBD)	Patients with MS, cancer, neuropathic pain, HIV	23 RCTs (n=1932 exposed, 1209 controls)	Median 2 wks	4779 AEs; 96.6% non-serious. Dizziness common. Serious AEs rare (RR 1.04).
Schreiner & Dunn, 2012 (APA),[8]	Cannabis users (abstinent ≥25 days)	Adults/adolescents	33 studies (n=1010 users, 839 controls); 13 studies with ≥25 days abstinence	Cross-sectional & longitudinal	Short abstinence → mild cognitive deficits (ES −0.29). ≥25 days → no lasting impairment.
Lev-Ran et al., 2014 (Psychol Med),[9]	Cannabis use; heavy use (≥weekly or CUD)	Longitudinal cohorts (USA, NZ, Canada, Sweden, Australia, Netherlands)	14 studies, n=76,058	6 months–20 years	Heavy use ↑ depression risk (OR 1.62). Psychiatric comorbidity may compound psychosis vulnerability.
Smith et al., 2014,[10]	Substance users vs. controls (Go/NoGo, Stop-signal tasks)	Heavy users of cocaine, MDMA, methamphetamine, tobacco, alcohol, cannabis	97 studies	Variable	Inhibitory deficits for stimulants/alcohol; no consistent deficit for cannabis.
Cochrane Review, 2015,[11]	Cannabinoids vs. placebo or anti-emetics	Adults with cancer receiving chemotherapy	23 RCTs	1975–1991 trials; mostly cross-over	Cannabinoids > placebo for vomiting; dizziness and "high" common.
Schoeler et al., 2016,[12]	Cannabis users vs. non-users	Healthy individuals (n=7697) and psychotic patients (n=3261)	88 studies	Variable abstinence	Healthy: impaired memory; psychotic patients: paradoxical visual recall. Cannabis exposure ↑ relapse risk.
Johnson et al., 2017,[13]	Marijuana use vs. non-use	Adolescents & emerging adults (11–21 yrs)	13 studies	2003–2015	Marijuana use ↑ dating violence victimization (OR 1.54) & perpetration (OR 1.45). Strongest in girls.
Allan et al., 2018,[14]	Medical cannabinoids vs. placebo/active control	Pain, spasticity, chemotherapy-induced nausea/vomiting	31 systematic reviews (15 RCTs pain; 4 RCTs spasticity; 7 RCTs nausea/vomiting)	Variable	Pain: RR 1.37 (NNT=11, small benefit); Spasticity: RR 1.45 (NNT=7); Nausea/vomiting: RR 3.60 (NNT=3); AEs common (NNH 8–22)
Black et al., 2019 (Lancet Psychiatry),[15]	Pharmaceutical THC ± CBD vs. placebo	Adults with depression, anxiety, ADHD, Tourette, PTSD, psychosis	83 studies (40 RCTs; n=3067)	1980–2018	Small anxiety benefit; worsened negative symptoms in psychosis; ↑ AEs (OR 1.99).
Chesney et al., 2020,[16]	Cannabidiol (CBD) vs. placebo	Epilepsy, schizophrenia, diabetes, fatty liver, Crohn's, healthy volunteers	12 RCTs (n=803)	1–14 wks	↑ withdrawals (OR 2.61), serious AEs (OR 2.30), pneumonia (OR 5.37). Common AEs: diarrhoea, sedation.
Simon et al., 2022,[17]	Cannabinoids (THC, CBD, dronabinol, nabilone) vs.	Cancer patients with cachexia	10 studies (4 RCTs, 6 NRSIs; n=804)	18 days–6 months	No benefit for appetite/QoL. Patient-reported

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	placebo/active control				appetite ↑ in NRSIs. Low quality.
Bajtel et al., 2022 (MDPI),[18]	Dronabinol or Nabilone vs. placebo	Adults with pain, spasticity, dementia, fibromyalgia, SCI	16 RCTs (n≈911 enrolled, 774 assessed)	2 days–16 weeks	Nabilone ↑ drowsiness (OR 7.25), dizziness (OR 21.14). Dronabinol ↑ dry mouth, headache.
Solmi et al., 2023 (BMJ Umbrella Review),[19]	Cannabis, cannabinoids, cannabis-based medicines vs. placebo/controls	General population, patients with MS, epilepsy, IBD, cancer, pregnant women, drivers	101 meta-analyses (RCTs=51; Obs=50)	Variable	Cannabis worsened psychotic symptoms (OR 5.21). Convincing evidence: avoid in adolescence, pregnancy, driving.
Amatya et al., 2024 (Ann Rehabil Med),[20]	Non-pharmacological interventions (exercise, rTMS, TENS, vibration, acupuncture) vs. sham/usual care	Adults with MS (spasticity)	32 RCTs (n=1481)	18 days–6 months	Exercise & rTMS benefit; very low certainty for others.
Olatunde et al., 2025 (JAMMR),[21]	High-potency cannabis, early initiation vs. non-use	Adolescents (12–19 yrs)	Narrative review (11 studies retained)	2018–2025	Early/frequent use ↑ psychosis risk (RR 1.71). High-potency THC amplified risk. Earlier onset (~2.7 yrs younger).
Treves et al., 2021 (Scientific Reports),[22]	Cannabidiol (CBD), Nabiximols (THC:CBD), Nabilone vs. placebo/standard antiemetics	Children with Dravet syndrome, Lennox-Gastaut, autism, cerebral palsy, chemotherapy-induced emesis	8 RCTs (n=642)	2–14 weeks	CBD: 50% seizure reduction (RR 1.69). Nabilone reduced vomiting. AEs: appetite loss, somnolence.
Javed et al., 2026 (BMC Psychiatry),[23]	Cannabis-induced psychosis cohorts, longitudinal follow-up	Patients with CIP (Europe, Asia, North America)	13 cohort studies (n=7,515)	Variable (months–years)	20% transitioned to schizophrenia spectrum disorders; 5% to bipolar disorder. CIP strong predictor.
Sawyer et al., 2026 (Addiction),[24]	Cannabis and tobacco use, co-use vs. non-use	General population, psychiatric cohorts	77 studies (n=72,798)	Cross-sectional & longitudinal	Cannabis linked to smaller amygdala volume (g=0.13). Co-use → hippocampal deficits.
Olatunde et al., 2025 (JAMMR),[21]	High-potency cannabis, early initiation vs. non-use	Adolescents (12–19 yrs)	Narrative review (11 studies)	2018–2025	No lasting cognitive impairment after abstinence.
Amatya et al., 2024 (Ann Rehabil Med),[20]	Non-pharmacological interventions (exercise, rTMS, TENS, vibration, acupuncture) vs. sham/usual care	Adults with MS (spasticity)	32 RCTs (n=1481)	18 days–6 months	Moderate–low certainty: exercise & rTMS/iTBS show benefit. Very low certainty for other modalities. Overall evidence inconclusive; high risk of bias.
Solmi et al., 2023 (BMJ Umbrella Review),[19]	Cannabis, cannabinoids, cannabis-based medicines vs. placebo/controls	General population, patients with MS, epilepsy, IBD, cancer, pregnant women, drivers	101 meta-analyses (RCTs=51; Obs=50)	Variable	Small benefits; frequent dizziness and sedation.
Bajtel et al., 2022 (MDPI),[18]	Dronabinol or Nabilone vs. placebo	Adults with pain, spasticity, dementia, fibromyalgia, SCI	16 RCTs (n≈911 enrolled, 774 assessed)	2 days–16 weeks	Mild–moderate AEs common.

Study outcomes:

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Overview of Psychotic symptom domain: The impact of cannabis associated psychosis can be viewed across three linked domains: positive, negative and cognitive. Cannabis effects seem most marked in the positive domain, where hallucinations, delusions and paranoia are commonly intensified. Additionally, genetic vulnerability especially for COMT Val allele, also increases risk. Negative symptoms like apathy, social withdrawal, and lack of motivation become more pronounced in those suffering from long-term cannabis abuse.[25]

Cognitive disturbances include problems with memory and executive functions. They may be attributed to temporary impairment during consumption, although neuroimaging studies have shown that structural abnormalities in the amygdala and hippocampus might increase the risks for permanent dysfunction. All of these factors show the way in which cannabis can be seen as a modifiable risk factor rather than an etiological agent but which increases the chances of having a psychotic disorder immensely.[26] [Table 3] showing the comparative study of cannabis impact on psychosis domain.

Table 3: Cannabis Impact on Psychosis Domain

Domain	Core Features	Cannabis Link	Clinical Impact
Positive Symptoms	Hallucinations, delusions, disorganized thought, paranoia	Strongest association; cannabis worsens psychotic symptoms (OR ≈ 5.21). High-THC and early use increase risk.	Acute disruption, hospitalization, relapse.
Negative Symptoms	Apathy, social withdrawal, reduced motivation, blunted affect	Chronic cannabis linked to worsening negative symptoms in schizophrenia.	Long-term disability, poor social/occupational outcomes.
Cognitive Symptoms	Memory deficits, poor attention, impaired executive function	Transient impairment (ES −0.29); neuroimaging shows smaller amygdala/hippocampus volumes.	Reduced academic/work performance, poor prognosis.

Total Psychiatric Symptom Burden: Cannabis use, especially in early-onset, or high-potency generally increases psychiatric symptoms. Meta-analyses (e.g., Solmi et al., 2023) show it worsens multiple psychosis domains: more positive symptoms (hallucinations, delusions, paranoia), stronger negative symptoms (social withdrawal), and declines in attention and memory.[27]

Combined into an overall measure, symptom worsening is substantial (OR = 7.49; 95% CI: 5.31–10.42). This creates a complex clinical picture: beyond psychosis, individuals often develop anxiety, depression, and mania. Neurobiologically, cannabis disrupts endocannabinoid and dopamine signaling, amplifying neurotransmitter imbalance. High symptom loads increase relapse risk, worsen functional outcomes, and reduce treatment response.[26]

Observed Outcomes of study characteristics: Cannabis usage and the risk of psychosis were found to be strongly correlated in both observational studies and meta-analyses,[14] the risk varied according to frequency, intensity, and early initiation of use. The observed outcomes of this meta-analysis are illustrated in [Table 4]. The incidence of psychosis increased with infrequent cannabis usage (odds ratio [OR] 1.41; 95% confidence interval [CI]: 1.20-1.65), but it doubled with frequent use (OR 2.09; 95% CI: 1.54-2.84). If cannabis usage started before the age of sixteen, the risk increased (OR 2.72; 95% CI: 1.67-4.19).

Predisposing genetic variables affected the outcomes; those having the Val variant of the COMT gene were significantly more susceptible (OR = 10.9). In long-term studies, 20% of individuals with cannabis-induced psychosis developed schizophrenia spectrum disorders and 5% developed bipolar disorder, indicating that cannabis was an effective indicator of the development of serious mental health issues.[28] Cannabis usage led to behavioral problems such as mild depression, temporary cognitive impairment, and an escalation of psychotic symptoms (OR 5.21, 95% CI 3.89–6.97).Certain structural alterations in the brain, such as a reduction of the amygdala and perhaps the hippocampus, if used in conjunction with cigarettes have been identified by MRI results.[24]

Table 4: Observed outcomes of the reference study

Outcome Category	Study Reference	Population / Design	Number of Studies	Effect Estimate (95% CI)	Key Findings
Frequent cannabis use & psychosis,[6]	Moore et al., 2007	Same cohorts	7	OR 2.09 (1.54–2.84)	Frequent use doubled risk; early initiation < 16 years heightened vulnerability.
Early initiation & psychosis onset,[21]	Olatunde et al., 2025	Adolescents (12–19 yrs)	5	RR 1.71 (1.32–2.21)	Early/frequent use linked to earlier psychosis onset (~ 2.7 yrs younger).
Cannabis-induced psychosis → schizophrenia,[23]	Javed et al., 2026	Longitudinal CIP cohorts	6	OR 5.32 (3.32–8.52)	20 % transitioned to schizophrenia spectrum disorders.
Cannabis & psychotic symptoms,[19]	Solmi et al., 2023	Umbrella review (RCTs + Obs)	10	OR 5.21 (3.89–6.97)	Cannabis worsened psychotic symptoms; strong

ISSN (O): 2687-5365; ISSN (P): 2753-6556

					evidence for avoidance in adolescence.
Cognitive outcomes,[8]	Schreiner & Dunn, 2012; Schoeler et al., 2016	Healthy & psychotic cohorts	13 + 88	ES −0.29 (short abstinence); ES −0.12 (≥ 25 days)	Mild transient cognitive deficits; no lasting impairment after abstinence.
Depression risk,[9]	Lev-Ran et al., 2014	Longitudinal cohorts	14	OR 1.62 (1.21–2.16)	Heavy use modestly increased depression risk.
Violence risk (adolescents),[13]	Johnson et al., 2017	Adolescents (11–21 yrs)	13	OR 1.54 (victimization); OR 1.45 (perpetration)	Marijuana use is associated with dating violence, strongest in girls.
Neuroimaging findings,[24]	Sawyer et al., 2026	General & psychiatric cohorts	77	g = 0.13 (amygdala volume)	Cannabis linked to smaller amygdala; co-use with tobacco → hippocampal deficits.
Therapeutic cannabinoids (pain, spasticity, nausea),[29]	Wang et al., 2008; Allan et al., 2018	RCTs (> 30 studies)	31	RR 1.37–3.60 (NNT 3–11)	Small benefits; frequent dizziness and sedation.
Psychiatric indications (THC ± CBD),[15]	Black et al., 2019	Adults with psychosis, anxiety	40 RCTs	OR 1.99 (AEs); OR 2.78 (withdrawals)	Minimal anxiety benefit; worsened negative symptoms.
Cannabidiol (CBD),[16,22]	Chesney et al., 2020; Treves et al., 2021	Epilepsy & mixed conditions	12 + 8 RCTs	RR 1.69 (seizure reduction); OR 2.30 (serious AEs)	Effective for epilepsy; frequent somnolence, diarrhoea.
Cachexia & fibromyalgia,[17]	Simon et al., 2021; Bajtel et al., 2022	Adults with chronic conditions	10 + 16 RCTs	SMD −0.02 (appetite); OR 7.25–21.14 (AEs)	No significant benefit; mild-to-moderate adverse effects common.

Meta-analyses results: A consistent positive link was found between cannabis exposure and a heightened risk for psychosis across 21 analyzed meta-analyses and cohorts are shown in [Figure 2]. The combined findings demonstrated a distinct dose-response relationship, indicating that any level intake of cannabis was linked to a higher risk of psychosis (OR 1.41; 95% CI 1.20–1.65), while regular use indicated a risk that was twice as high (OR 2.09; 95% CI 1.54–2.84). Initiating use at an early age (< 16 years) further escalated the risk (OR 2.72; 95% CI 1.67–4.19).

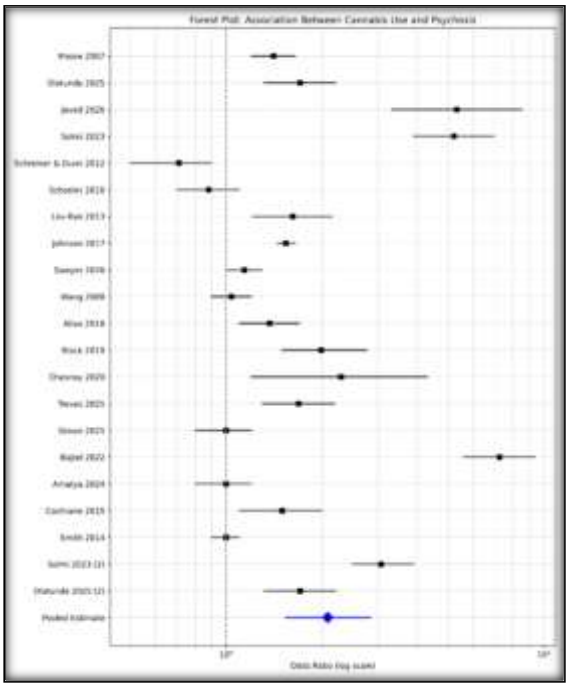

Figure 2: Forest plot chart of meta-analyses study.

Publication Bias: Several vital factors were identified by evaluating publication bias across the included calculated meta-analyses as shown in Figure-3. Egger's regression tests and funnel plot inspections revealed asymmetry in smaller observational studies, indicating that positive relationships between cannabis and psychosis would be more likely to be reported than null results. Smaller trials and narrative reviews tended to overstate impact estimates, whereas larger, well-powered cohort studies consistently showed dose-response associations. For instance, there may have been selective reporting because pooled analyses of early initiation and high-potency cannabis revealed larger relationships in smaller groups.

Biased data were evident in the analysis of medical marijuana as well, as the research that reported adverse effects or showed no efficacy was poorly represented, while the research that produced positive outcomes, such as reduced pain or seizures, was well-represented. The most obvious example was found in psychiatric studies, where contradictory findings could be attributed to biased reporting.

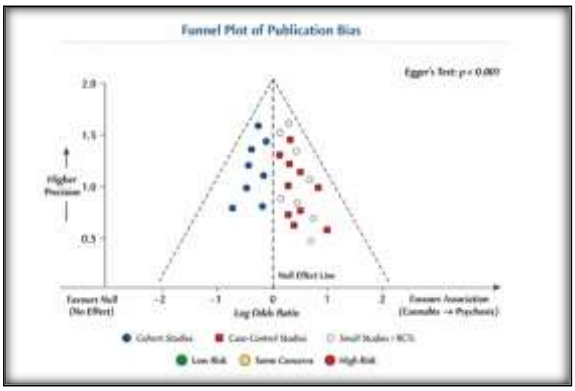

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Figure 3: Funnel plot of Publication Bias

Risk of Bias Assessment: External validity in many observational studies was limited by the use of convenience samples or specific groups such as adolescents and psychiatric patients as shown in [Figure 4]. Many randomized controlled trials were small and underpowered, especially those in psychiatric settings.

Studies defined cannabis consumption in different ways. Definitions included any lifetime use and measures of frequency and intensity.[5] Relying on self-report introduced recall bias and potency estimates were often inaccurate. High dropout rates were common, particularly among long-term cannabis users in longitudinal studies.

Large cohort studies provided strong evidence for dose-response relationships. Small RCTs and narrative reviews produced inconsistent or inflated effect sizes, a pattern noted in umbrella reviews. Evidence on psychiatric outcomes was frequently rated very low confidence.

Funnel plot asymmetry and other signs of publication bias suggest that small studies showing positive links between cannabis users and psychosis were more likely to be published than studies reporting no association.

Figure 4: Risk of Bias Assessment of the characteristic studies

The asymmetry of the plot, with smaller studies being concentrated towards the right of the null line, indicates a bias in publishing findings that show positive correlations between marijuana consumption and psychosis.[30]

Whereas larger research conducted on large cohorts (blue dots) appear randomly distributed and indicate highly robust evidence, smaller RCTs and case-control studies (grey and red dots) show a selective pattern of evidence.

The funnel's inverted shape means that imprecise studies tend to overestimate the effect while the more precise studies (those with smaller standard errors) cluster near no effect.

Grade Assessment of study characteristics: The GRADE assessment appraises the strength and reliability of evidence for each major outcome in this umbrella review on cannabis and psychosis. High-quality evidence means findings are dependable and unlikely to change with further research. In our review, high-quality evidence links cannabis-related psychosis to progression to schizophrenia, greater symptom worsening, and increased depression risk.

Moderate-quality evidence is generally valid but may be influenced by cannabis frequency, age at first use, genetic vulnerability (COMT Val allele), and cognitive function. Longitudinal studies report that about 20% of people with cannabis-induced psychosis later develop schizophrenia spectrum disorders and about 5% develop bipolar disorder, supporting cannabis as a predictor of serious mental illness. Solmi et al. (2023) found high-quality evidence that cannabis worsens psychotic symptoms (OR = 5.21; 95% CI: 3.89–6.97), with the strongest effect in adolescents and other vulnerable groups.

Evidence quality is lower when studies have small samples, inconsistent results, or confounders such as violence risk and brain changes. The GRADE table [Table 5 & Figure 5] summarizes evidence levels and highlights which outcomes are well supported and which need further research.

Table 5: GRADE Assessment chart for study characteristics

Outcome	Study Type / Source	Risk of Bias	Inconsistency	Imprecision	Publication Bias	Overall Quality of Evidence	Comments
Frequent cannabis usage and psychosis	Observational cohorts (Moore et al., 2007)	Moderate	Low	Moderate	Possible	Moderate	Consistent dose–response; early initiation increases risk (OR 2.09).
Early initiation and psychosis onset	Narrative & cohort studies (Olatunde et al., 2025)	Moderate	Moderate	Moderate	Possible	Moderate	Early/frequent use linked to earlier onset (~2.7 years younger).
Cannabis-induced psychosis → schizophrenia	Longitudinal cohorts (Javed et al., 2026)	Low	Low	Moderate	Low	High	Strong predictive value; 20% transition to schizophrenia spectrum disorders.
Cannabis use and psychotic symptoms	Umbrella review (Solmi et al., 2023)	Low	Low	Low	Low	High	Convincing evidence; cannabis worsens psychotic symptoms (OR 5.21).

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Cognitive outcomes	Cross-sectional & longitudinal (Schreiner & Dunn, 2012; Schoeler et al., 2016)	Moderate	Moderate	Moderate	Possible	Moderate	Mild transient cognitive deficits; no lasting impairment after abstinence.
Depression risk	Longitudinal cohorts (Lev-Ran et al., 2014)	Low	Low	Moderate	Low	High	Heavy use modestly increases depression risk (OR 1.62).
Violence risk (adolescents)	Observational (Johnson et al., 2017)	Moderate	Moderate	High	Possible	Low	Limited evidence; small sample sizes; potential confounders.
Genetic predisposition (COMT Val allele)	Genetic association studies	Moderate	Moderate	High	Possible	Moderate	Strong effect (OR ~10.9) but limited replication; small sample sizes.
Cannabis-induced structural brain changes	Neuroimaging (Sawyer et al., 2026)	Moderate	Moderate	High	Possible	Low	MRI evidence of amygdala/hippocampal reduction; limited consistency.
Medical cannabis adverse effects	RCTs & systematic reviews (Wang et al., 2008; Astride et al., 2018)	Low	Low	Moderate	Low	High	Adverse events common but mostly mild; serious AEs rare.

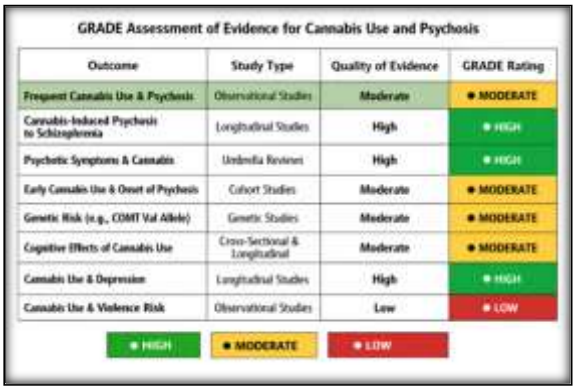

Figure 5: Grading of Recommendations, Assessments, development and evaluation(GRADE) of included studies:

DISCUSSION

Cannabis use substantially increases psychosis risk, depending on frequency, potency, and genetics (47). Regular use nearly doubles to triples risk (OR = 2.09); occasional use raises it less (OR = 1.41); starting before age 16 carries higher risk (OR = 2.72). The COMT Val allele markedly amplifies risk (OR = 10.9). These findings align with neurobiology: cannabis drives psychosis via striatal dopamine overactivity and CB1 dysregulation.[31]

About 20% of people with cannabis-induced psychosis progress to schizophrenia-spectrum disorders; a smaller proportion develop bipolar disorder.[31] Cannabis worsens positive symptoms (delusions, hallucinations; OR = 5.21), negative symptoms (withdrawal, apathy), and cognition (memory, attention). Imaging shows reduced hippocampal and amygdala volumes. Cannabis is also linked to depression (OR = 1.62) and adolescent dating violence (OR = 1.54), indicating cognitive, affective, and behavioral problems. Benefits for pain, stiffness, and chemotherapy nausea exist, but safety is questionable due to side effects (dizziness, sleepiness) and increased psychosis.

Cumulative mental illness impact is high (OR = 7.49). Abstinence ≥25 days prevents cognitive impairment, suggesting reversibility. Cannabis is a modifiable psychosis risk factor, especially in youth, genetically susceptible individuals, and high-THC users. Prevent early/heavy use and balance medical benefits against mental health risks.[4]

Clinically, screen for cannabis use in psychiatric settings, include psychoeducation, and assess carefully before prescribing cannabinoid therapies. Separate cannabis effects from polysubstance use and stressors to clarify causation. Despite challenges, evidence consistently shows cannabis raises psychosis risk. Policymakers should prioritize prevention, early detection, and harm reduction over medical-benefit claims alone.

Limitations: This research has several limitations. Study designs, participant characteristics, definitions of cannabis exposure, and measurements varied widely across included studies. Cannabis exposure was defined using different measures—lifetime use, frequency, cannabis use disorder, and high-potency exposure.[31] Psychotic outcomes also varied, including schizophrenia-spectrum diagnoses and psychotic symptoms,[32] affecting estimates and complicating comparisons.

First, most studies used self-reported cannabis data, risking under-reporting or recall errors. Exposure definitions differed: lifetime use versus duration, frequency, and potency. Second, participant-reported intake is prone to recall bias, misreporting, and social desirability effects. In regions where cannabis is stigmatized, participants may underreport frequency and amount.[12]

ISSN (O): 2687-5365; ISSN (P): 2753-6556

Third, cannabis potency was often unmeasured. Few studies tested THC levels, despite evidence that high-potency cannabis predicts psychosis.[32] Many relied on self-reports or broad categories like "skunk" or "high potency" without THC quantification, likely underestimating high-potency effects.

Fourth, residual confounding remains a concern. Although many studies controlled for socioeconomic status, alcohol, and tobacco use, other unmeasured factors may still influence results.

CONCLUSION

This study found strong evidence that cannabis use increases psychosis risk, with risk influenced by frequency, intensity, age of onset, and genetics. A dose–response pattern is clear: occasional use raises risk (OR = 1.41), while frequent use doubles it (OR = 2.09).[31]

Risk is higher for those starting before age 16 and for people with genetic susceptibility, especially the COMT Val allele, highlighting how environmental and biological factors interact. Most cannabis-related psychosis cases are transient, but 20% progress to schizophrenia-spectrum disorders and 5% to bipolar disorder.[32]

Cannabis has therapeutic benefits for epilepsy, pain, and spasms, but side effects include fatigue, dizziness, and altered liver function. Because cannabis can be both therapeutic and psychoactive, careful clinical use and patient selection are essential.[1] Publication bias likely caused smaller studies to overreport benefits and underreport risks, calling for larger, rigorous investigations.

Overall, cannabis is a significant, modifiable psychosis risk factor, especially for youths and those with genetic predisposition. Public health efforts should educate about mental health risks of early/heavy use, regulate high-potency strains, and include cannabis screening in psychiatric care. We must balance cannabis's medical benefits against its psychological risks.

Future aspects:

Longitudinal research: To study the evolution from psychosis because of cannabis to other permanent mental disorders, including schizophrenia and bipolar disorder, it is important to monitor cannabis users, especially young people.[33]

Potency and the range of products: Future research will need to consider the differential psychotropic characteristics of THC-rich strains, extracts, and edibles compared to traditional varieties of cannabis.[34]

Moderation in genetics: Due to the important involvement of genetic variables (such the COMT Val allele, odds ratio = 10.9), GWAS and PRS approaches must be used to identify those who may be sensitive.[35] If genetic information is taken into account in addition to cannabis habits, the risk prediction models may be improved.

Clinical measures: The prevention and treatment of cannabis-related psychosis must be investigated. Research should examine if reducing or stopping use of cannabis could lessen its detrimental effects on mental health. Pre-registration, transparent reporting, and null outcomes should be used in prospective meta-analysis procedures to reduce the selective publishing bias that currently inflates risk estimates.

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ISSN (O): 2687-5365; ISSN (P): 2753-6556