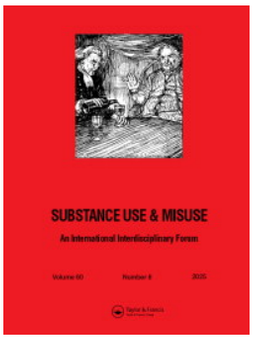

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NOTE

Associations of Local Cannabis Policy and Retail Availability in Northern California with Adverse Adolescent Mental Health Outcomes

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ABSTRACT

Background: Local policies prohibiting cannabis sales and lower cannabis retail availability are associated with a lower prevalence of adolescent cannabis use. In this study, we examined whether local prohibitions on cannabis retail and cannabis retailer proximity and density are associated with adverse cannabis-related mental health outcomes among adolescents.

Methods: Cross-sectional study of 95,645 Northern California adolescents aged 13–17 who completed a well-check questionnaire in 2021 during standard pediatric care. Exposures included local bans on cannabis storefront and delivery retailers, and retail proximity and density in relation to adolescents' geocoded residences. Past-year psychotic, depressive, and anxiety disorders were identified using ICD codes; self-reported depression symptoms came from the questionnaire.

Results: Relative to adolescents in jurisdictions allowing storefront and delivery retail, those in jurisdictions prohibiting storefront retail only (aPR = 0.52; 95%CI: 0.32–0.85), or prohibiting both (aPR = 0.67; 95%CI: 0.48–0.92) had a lower prevalence of psychotic disorders. Greater retailer density (≥6 *vs.* 0 retailers within a 15-min drive) was associated with a greater prevalence of anxiety disorders (aPR = 1.11; 95%CI: 1.04–1.19), depressive disorders (aPR = 1.10; 95%CI: 1.02–1.19) and depression symptoms (aPR = 1.08; 95%CI: 1.01–1.15). Having a ≥20-min (*vs.* <5-min) drive to the nearest retailer was associated with a lower prevalence of psychotic (aPR = 0.53; 95%CI: 0.33–0.86), anxiety (aPR = 0.89; 95%CI: 0.82–0.97), and depressive disorders (aPR = 0.89; 95%CI: 0.81–0.98) and depression symptoms (aPR = 0.91; 95%CI: 0.84–0.99).

Conclusions: Local policies prohibiting storefront retail were associated with a lower prevalence of psychotic disorders. Greater retail availability of cannabis near adolescents' residences was associated with a greater prevalence of psychotic, anxiety, and depressive disorders, and depression symptoms. Policies limiting retail density and availability may help reduce cannabis-related harms and merit further assessment.

KEYWORDS

Adolescent; marijuana; policy; legalization; psychotic disorders; depression; anxiety; psychiatric

Introduction

Cannabis use, especially when frequent or initiated during adolescence, is associated with adverse outcomes including psychotic disorders, anxiety disorders, and depressive disorders (Gobbi et al., 2019; Han et al., 2021; Kiburi et al., 2021; Lorenzetti et al., 2020; Lowe et al., 2024; van der Steur et al., 2020). State legalization of cannabis for adult-use is associated with lower perceived harmfulness of cannabis among adolescents (Kim et al., 2022), but its relationship with adolescent cannabis use is mixed (Pacula et al., 2022). Importantly, the implementation of state-level policies can vary at the local level (Padon et al., 2022; Silver et al., 2020), leading to important differences in cannabis access, particularly in states which allow local control of cannabis commerce. Local policies allowing retailers and greater retail availability expose youth to advertising and signage, promotions *via* social media, social normalization of cannabis, greater use among adults, and diversion, and are associated with greater cannabis use and lower perceived cannabis risks among adolescents (Firth et al., 2022; Garcia-Ramirez et al., 2021; Paschall & Grube, 2020; Young-Wolff et al., 2024).

Our prior study of adolescents in California in 2021, the fourth year of legal recreational sales, found a lower prevalence of cannabis use and problematic cannabis use among adolescents living in jurisdictions that prohibited *vs.* allowed storefront retailers or delivery (Young-Wolff et al., 2024). Further, those with a longer drive time to the nearest

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cannabis retailer had a lower prevalence of cannabis use. Yet, it is unknown whether local variation in the cannabis retail environment is associated with cannabis-related adverse mental health outcomes among adolescents.

This study tests whether local policies prohibiting *vs.* allowing cannabis sales and availability of legal retailers in Northern California near adolescents' residences are associated with past-year psychotic, depressive, and anxiety disorder diagnoses and current depression symptoms. Understanding the relationship of these factors to adolescent cannabis-related mental health outcomes is essential for guiding public policies and prevention.

Methods

Sample

Kaiser Permanente Northern California (KPNC) is an integrated healthcare delivery system serving ~4.6 million patients similar to Northern California's insured population (Gordon, 2020). All adolescents aged 13–17 with a valid address in KPNC 35 counties who had a teen well-check questionnaire (TWCQ) during standard pediatric care in 2021 were eligible (n = 106,195 completed questionnaires, n = 104,338 unique adolescents; see eMethods). We excluded adolescents with <1-year continuous KPNC membership (n = 7,489). We used the most recent questionnaire if an adolescent had >1 during the study (N = 1,741). The final sample was 95,645 adolescents. The KPNC IRB approved the study and waived informed consent.

Measures

Outcomes

Psychotic, anxiety, and depressive disorders were based on ICD-10-CM codes documented in electronic health records (EHRs) during the year before the TWCQ screening (eMethods).

KPNC systematically screens all adolescents aged 13–17 in a confidential manner about general health (e.g., nutrition, sleep) and sensitive mental health topics, including depression symptoms with the TWCQ. Pediatricians privately review and confirm responses. Past two-week depression symptoms were based on a score of ≥3 on the Patient Health Questionnaire 2 (PHQ-2) (Kroenke et al., 2003), a validated questionnaire in the TWCQ that assessed: (1) little interest or pleasure in doing things, and (2) feeling down, depressed, or hopeless, with answer options of not at all (0), several days (1), more than half the days (2), and nearly all days (3).

Exposures

Local cannabis storefront and delivery policy. California legalized medical cannabis in 1996 and "adult-use" (recreational) cannabis in November 2016. Legal adult-use sales began in January 2018, three years before this study. Cities and counties (jurisdictions) retained authority to ban or allow medical or adult-use storefront retailers or delivery. Similar to our prior work (Silver et al., 2020; Young-Wolff et al., 2024), we extracted information on local cannabis policy allowing any adult-use or medical retail outlets or delivery for the year before well-check screenings (i.e., 2020–2021) in the KPNC catchment area from the Fyllo Regulatory Database, complemented by verification on jurisdictions' websites and municipal codes and outreach to jurisdiction staff when needed (eMethods).

Cannabis storefront retailer proximity and density. As in prior work (Young-Wolff et al., 2024), we used the California Department of Cannabis Control (DCC) database to determine addresses and license dates as a proxy for operation dates for storefront retail licensees for medical and/or adult-use active in 2020–2021 in the KPNC catchment area. In addition to storefront retailers, addresses and license dates of microbusinesses (i.e., businesses with ≥3 of the following at one location: cultivation, manufacturing, distribution, retail) with retail operations in 2020–2021 were obtained from DCC. We calculated drive time from each patient's geocoded address to all medical and adult-use storefronts within a 60-min driving radius using ArcGIS Pro Version 2.2.4 (Esri). We calculated proximity to the nearest storefront retailer (<5, 5–9, 10–19, ≥20-min drive) and density within a 15-min drive (0, 1–5, ≥6 retailers) during the year before screening (Young-Wolff et al., 2024).

Socio-demographics

We extracted EHR data on age, sex, self-reported race and ethnicity, neighborhood deprivation index (NDI, in quartiles) (Messer et al., 2006); and patient geocoded home addresses at the time of the TWCQ.

Analysis

Adjusted prevalence ratios (aPRs) and two-tailed 95% CIs for each exposure were estimated using separate multivariable modified Poisson regression models accounting for clustering of adolescents within jurisdictions (Zou, 2004). Outcomes were modeled separately, adjusting for socio-demographics. Adolescents without self-reported depression information (n = 698) were excluded from that analysis. Analyses were performed in SAS 9.4. Sensitivity analyses were conducted to evaluate the potential impact of unmeasured confounding by computing e-values (Mathur et al., 2018; VanderWeele & Ding, 2017).

Results

The sample (n = 95,645 adolescents) was 20.4% Asian/Pacific Islander (API), 7.4% Black, 28.0% Hispanic, 32.6% non-Hispanic White, and 11.6% Multiracial/Native-American/unknown, with a median (IQR) age of 15 (14–16) years; 48.9% were female; 0.2% had a past-year psychotic disorder, 9.3% a past-year anxiety disorder, 7.8% a past-year depressive disorder, and 10.0% self-reported current depression.

Socio-demographics, retail policies, and retailer proximity and density by outcomes are provided in Table 1.

Local cannabis storefront and delivery policies examined separately

Overall, 49.0% and 34.4% of adolescents lived in jurisdictions prohibiting storefront retailers and delivery, respectively (Table 1). Adolescents living in jurisdictions prohibiting (*vs.* allowing) storefronts had a lower prevalence of psychotic disorders (aPR = 0.64; 95%CI: 0.48–0.86) and those living in jurisdictions prohibiting (*vs.* allowing) delivery had a lower prevalence of anxiety disorders (aPR = 0.93; 95%CI: 0.87–0.99) (eTable 1).

Local cannabis storefront and delivery policies examined together

Compared to adolescents living where both storefront retailers and delivery were allowed, those living where both were prohibited had a lower prevalence of psychotic disorders

Table 1. Descriptive characteristics overall and across cannabis-related outcomes, among adolescents aged 13–17 screened during 2021, Kaiser Permanente Northern California.

		Psychotic disorders		Anxiety disorders		Depressive disorders		Depression symptoms[a]	
		Yes	No	Yes	No	Yes	No	Yes	No
Characteristics *N*	Overall *N* = 95,645	*N* = 186 (0.2%)	*N* = 95,459 (99.8%)	*N* = 8,872 (9.3%)	*N* = 86,773 (90.7%)	*N* = 7,507 (7.8%)	*N* = 88,138 (92.2%)	*N* = 9,502 (10.0%)	*N* = 85,445 (90.0%)
Socio-demographics									
Age, median (Q1–Q3)	15.0 (14.0–16.0)	15.0 (14.0–16.0)	15.0 (14.0–16.0)	15.0 (14.0–16.0)	15.0 (14.0–16.0)	15.0 (14.0–16.0)	15.0 (14.0–16.0)	15.0 (14.0–16.0)	15.0 (14.0–16.0)
Age, years									
13–14	43,377 (45.4)	54 (29.0)	43,323 (45.4)	3,249 (36.6)	40,128 (46.2)	2,607 (34.7)	40,770 (46.3)	3,977 (41.9)	39,055 (45.7)
15–17	52,268 (54.6)	132 (71.0)	52,136 (54.6)	5,623 (63.4)	46,645 (53.8)	4,900 (65.3)	47,368 (53.7)	5,525 (58.1)	46,390 (54.3)
Sex									
Female	46,779 (48.9)	128 (68.8)	46,651 (48.9)	6,335 (71.4)	40,444 (46.6)	5,551 (73.9)	41,228 (46.8)	6,435 (67.7)	39,989 (46.8)
Male[b]	48,866 (51.1)	58 (31.2)	48,808 (51.1)	2,537 (28.6)	46,329 (53.4)	1,956 (26.1)	46,910 (53.2)	3,067 (32.3)	45,456 (53.2)
Race and ethnicity									
Asian/PI	19,532 (20.4)	28 (15.1)	19,504 (20.4)	937 (10.6)	18,595 (21.4)	946 (12.6)	18,586 (21.1)	1,504 (15.8)	17,910 (21.0)
Black	7032 (7.4)	20 (10.8)	7,012 (7.3)	459 (5.2)	6,573 (7.6)	560 (7.5)	6,472 (7.3)	864 (9.1)	6,105 (7.1)
Hispanic	26,764 (28.0)	46 (24.7)	26,718 (28.0)	2,484 (28.0)	24,280 (28.0)	2,132 (28.4)	24,632 (27.9)	2,941 (31.0)	23,606 (27.6)
Non-Hispanic White	31,203 (32.6)	61 (32.8)	31,142 (32.6)	4,084 (46.0)	27,119 (31.3)	3,084 (41.1)	28,119 (31.9)	3,111 (32.7)	27,880 (32.6)
Multiracial/ Native-American/ unknown	11,114 (11.6)	31 (16.7)	11,083 (11.6)	908 (10.2)	10,206 (11.8)	785 (10.5)	10,329 (11.7)	1,082 (11.4)	9,944 (11.6)
NDI									
Q1 (least deprived)	25,270 (26.4)	47 (25.3)	25,223 (26.4)	2,450 (27.6)	22,820 (26.3)	1,886 (25.1)	23, 384 (26.5)	2,055 (21.6)	23,063 (27.0)
Q2	23,557 (24.6)	39 (21.0)	23,518 (24.6)	2,381 (26.8)	21,176 (24.4)	1,931 (25.7)	21,626 (24.5)	2,251 (23.7)	21,108 (24.7)
Q3	24,441 (25.6)	49 (26.3)	24,392 (25.6)	2,256 (25.4)	22,185 (25.6)	1,989 (26.5)	22,452 (25.5)	2,564 (27.0)	21,698 (25.4)
Q4 (most deprived)	22,377 (23.4)	51 (27.4)	22,326 (23.4)	1,785 (20.1)	20,592 (23.7)	1,701 (22.7)	20,676 (23.5)	2,632 (27.7)	19,576 (22.9)
Local cannabis policy									
Storefront retail policy[c]									
Prohibited	46,835 (49.0)	70 (37.6)	46,765 (49.0)	4,350 (49.0)	42,485 (49.0)	3,618 (48.2)	43,217 (49.0)	4,395 (46.3)	42,147 (49.3)
Allowed	48,810 (51.0)	116 (62.4)	48,694 (51.0)	4,522 (51.0)	44,288 (51.0)	3,889 (51.8)	44,921 (51.0)	5,107 (53.7)	43,298 (50.7)
Delivery retail policy[c]									
Prohibited	32,868 (34.4)	53 (28.5)	32,815 (34.4)	2,944 (33.2)	29,924 (34.5)	2,517 (33.5)	30,351 (34.4)	3,119 (32.8)	29,566 (34.6)
Allowed	62,777 (65.6)	133 (71.5)	62,644 (65.6)	5,928 (66.8)	56,849 (65.5)	4,990 (66.5)	57,787 (65.6)	6,383 (67.2)	55,879 (65.4)
Storefront and delivery retail policy[d]									
Both allowed	47,158 (49.3)	114 (61.3)	47,044 (49.3)	4,358 (49.1)	42,800 (49.3)	3,755 (50.0)	43,403 (49.2)	4,951 (52.1)	41,830 (49.0)
Delivery allowed, storefront prohibited	13,606 (14.2)	17 (9.1)	13,589 (14.2)	1,376 (15.5)	12,230 (14.1)	1,075 (14.3)	12,531 (14.2)	1,244 (13.1)	12,253 (14.3)
Both prohibited	34,861 (36.5)	55 (29.6)	34,806 (36.5)	3,136 (35.3)	31,725 (36.6)	2,677 (35.7)	32,184 (36.5)	3,304 (34.8)	31,345 (36.7)
Cannabis storefront retailer proximity and density									
Proximity									
Drive time to nearest retailer, min, median (Q1–Q3)	10.0 (5.7–16.6)	7.8 (4.3–13.5)	10.0 (5.7–16.6)	10.0 (5.6–16.7)	10.0 (5.7–16.6)	9.8 (5.5–16.2)	10.0 (5.7–16.6)	9.3 (5.4–15.3)	10.1 (5.8–16.7)
Drive time to nearest retailer, min									
<5	19,445 (20.3)	58 (31.2)	19,387 (20.3)	1,874 (21.1)	17,571 (20.2)	1,628 (21.7)	17,817 (20.2)	2,105 (22.2)	17,160 (20.1)
5–9	28,255 (29.5)	55 (29.6)	28,200 (29.5)	2,577 (29.0)	25,678 (29.6)	2,209 (29.4)	26,046 (29.6)	3,000 (31.6)	25,035 (29.3)
10–19	32,629 (34.1)	49 (26.3)	32,580 (34.1)	2,979 (33.6)	29,650 (34.2)	2,520 (33.6)	30,109 (34.2)	3,076 (32.4)	29,326 (34.3)
≥20	15,316 (16.0)	24 (12.9)	15,292 (16.0)	1,442 (16.3)	13,874 (16.0)	1,150 (15.3)	14,166 (16.1)	1,321 (13.9)	13,924 (16.3)
Density									
No. of retailers within 15-min drive, median (Q1–Q3)	4.0 (0.0–13.0)	6.0 (1.0–15.0)	4.0 (0.0–13.0)	4.0 (0.0–13.0)	4.0 (0.0–13.0)	4.0 (0.0–13.0)	4.0 (0.0–13.0)	5.0 (0.0–13.0)	4.0 (0.0–13.0)
Density of retailers within 15-min drive									
0	28,627 (29.9)	40 (21.5)	28,587 (29.9)	2,670 (30.1)	25,957 (29.9)	2,177 (29.0)	26,450 (30.0)	2,474 (26.0)	26,004 (30.4)
1–5	25,189 (26.3)	52 (28.0)	25,137 (26.3)	2,256 (25.4)	22,933 (26.4)	1,936 (25.8)	23,253 (26.4)	2,619 (27.6)	22,369 (26.2)
≥6	41,829 (43.7)	94 (50.5)	41,735 (43.7)	3,946 (44.5)	37,883 (43.7)	3,394 (45.2)	38,435 (43.6)	4,409 (46.4)	37,072 (43.4)

[a]Excluding 698 missing data on self-reported depression.
[b]Includes other/unknown.
[c]Based on policy in place during the year prior to screening.
[d]Based on policy in place as of January 1st, 2021, excluding 1 with only storefront retail allowed and 19 with storefront retail allowed and delivery only from outside without a permit.

Table 2. Adjusted modified Poisson regression results, among adolescents aged 13–17 screened during 2021, Kaiser Permanente Northern California.

Each exposure modeled separately	Psychotic disorders		Anxiety disorders		Depressive disorders		Depression symptoms[a]	
	N (%)	aPR (95% CI)	*N* (%)	aPR (95% CI)	*N* (%)	aPR (95% CI)	*N* (%)	aPR (95% CI)
Local cannabis policy								
Storefront and delivery retail policy[b]								
Both allowed	114 (0.24)	1 [ref]	4,358 (9.24)	1 [ref]	3,755 (7.96)	1 [ref]	4,951 (10.58)	1 [ref]
Delivery allowed, storefront prohibited	17 (0.12)	**0.52 (0.32–0.85)**	1,376 (10.11)	0.99 (0.90–1.09)	1,075 (7.90)	0.97 (0.88–1.07)	1,244 (9.22)	0.97 (0.89–1.05)
Both prohibited	55 (0.16)	**0.67 (0.48–0.92)**	3,136 (9.00)	0.93 (0.87–1.00)	2,677 (7.68)	0.95 (0.88–1.03)	3,304 (9.54)	0.97 (0.90–1.05)
Cannabis storefront retailer proximity and density								
Drive time to nearest retailer, min								
<5	58 (0.30)	1 [ref]	1,874 (9.64)	1 [ref]	1,628 (8.37)	1 [ref]	2,105 (10.93)	1 [ref]
5–9	55 (0.19)	**0.66 (0.47–0.94)**	2,577 (9.12)	0.95 (0.88–1.01)	2,209 (7.82)	0.94 (0.88–1.01)	3,000 (10.70)	0.99 (0.93–1.05)
10–19	49 (0.15)	**0.51 (0.35–0.75)**	2,979 (9.13)	**0.91 (0.85–0.98)**	2,520 (7.72)	0.93 (0.87–1.00)	3,076 (9.49)	0.96 (0.89–1.04)
≥20	24 (0.16)	**0.53 (0.33–0.86)**	1,442 (9.41)	**0.89 (0.82–0.97)**	1,150 (7.51)	**0.89 (0.81–0.98)**	1,321 (8.67)	**0.91 (0.84–0.99)**
Density of retailers within 15-min drive								
0	40 (0.14)	1 [ref]	2,670 (9.33)	1 [ref]	2,177 (7.60)	1 [ref]	2,474 (8.69)	1 [ref]
1–5	52 (0.21)	1.45 (0.94–2.22)	2,256 (8.96)	1.01 (0.95–1.07)	1,936 (7.69)	1.02 (0.95–1.09)	2,619 (10.48)	**1.10 (1.03–1.17)**
≥6	94 (0.22)	1.58 (0.99–2.52)	3,946 (9.43)	**1.11 (1.04–1.19)**	3,394 (8.11)	**1.10 (1.02–1.19)**	4,409 (10.63)	**1.08 (1.01–1.15)**

aPR: adjusted prevalence ratio; CI: confidence interval.
Bold indicates statistical significance with CIs not containing null values (e.g., aPR = 1). Bolded CIs that include 1 are due to rounding.
Models adjusted for age, sex, race and ethnicity, and neighborhood deprivation index quartile.
[a]Excluding 698 missing data on self-reported depression.
[b]Based on policies in place as of January 1st, 2021, excluding adolescents who lived in jurisdictions with only storefront retail allowed or storefront retail allowed and delivery from outside only without a permit ($n = 20$ [0.0%] from all models).

(aPR = 0.67; 95%CI: 0.48–0.92), but not anxiety disorders (aPR = 0.93; 95%CI: 0.87–1.99), depressive disorders (aPR = 0.95; 95%CI: 0.88–1.03), or depression symptoms (aPR = 0.97; 95%CI: 0.90–1.05) (Table 2; eTable 2). Additionally, those who lived where storefront retailers were prohibited but delivery was allowed had a lower prevalence of psychotic disorders (aPR = 0.52; 95%CI: 0.32–0.85).

Cannabis storefront retailer proximity and density

Overall, adolescents had a median (IQR) drive time to the nearest retailer of 10.0 min (5.7–16.6) and a median (IQR) of 4 (0–13) retailers within a 15-min drive from their homes (Table 1). A ≥20-min (*vs.* <5-min) drive time to the nearest cannabis retailer was associated with a lower prevalence of psychotic (aPR = 0.53; 95%CI: 0.33–0.86), anxiety (aPR = 0.89; 95%CI: 0.82–0.97), and depressive disorders (aPR = 0.89; 95%CI: 0.81–0.98), and depression symptoms (aPR = 0.91; 95%CI: 0.84–0.99) (Table 2; eTable 2). Greater retailer density within a 15-min drive was associated with greater prevalence of anxiety disorders (aPR = 1.11; 95%CI: 1.04–1.19 for ≥6 *vs.* none), depressive disorders (aPR = 1.10; 95%CI: 1.02–1.19 for ≥6 *vs.* none), and depression symptoms (aPR = 1.10; 95%CI: 1.03–1.17 for 1–5, aPR = 1.08; 95%CI: 1.01–1.15 for ≥6 *vs.* none).

E-value sensitivity analyses

E-values for the aPRs for psychotic disorders were high, ranging from 2.26 to 3.33, and for other outcomes were somewhat smaller (range: 1.11–1.50), meaning that an unmeasured confounder would need to have associations of at least that magnitude with both the exposure (local policy or proximity/density) and the psychiatric outcome to fully explain reported associations (eTable 3).

Discussion

This large study of California adolescents found that local bans on cannabis storefronts or on both storefronts and delivery were associated with a lower prevalence of past-year psychotic disorders. Greater retail availability of cannabis was associated with a higher prevalence of psychotic, anxiety, and depressive disorders, and depression symptoms. Notably, despite storefront bans, approximately half of adolescents lived within a 10-min drive of a retailer, suggesting that overall access, including across jurisdictional borders, may have stronger associations with psychiatric outcomes than local bans alone.

Findings extend prior research showing that adolescents in areas with legal cannabis retailers or greater retail availability report higher perceived cannabis availability, cannabis use and problematic use, and lower perceived risks (Firth et al., 2022; Garcia-Ramirez et al., 2021; Paschall & Grube, 2020; Young-Wolff et al., 2024). Although adolescents cannot legally purchase cannabis, exposure to youth-appealing marketing, access through older peers, or the use of fake identification may facilitate indirect access. Greater access to cannabis may also contribute to higher adolescent use by normalizing consumption within social and familial networks (Farrelly et al., 2023). Legalization has been associated with higher frequency of adolescent cannabis use (Coley et al., 2024) and greater retail availability of cannabis has

been associated with greater use of alternative consumption methods (e.g., vaping, dabbing), that provide higher doses of tetrahydrocannabinol (THC) and potentially elevated risk of dependency and psychiatric conditions (Borodovsky et al., 2017; Leal & Moscrop-Blake, 2024; Wadsworth et al., 2022). The relationship between greater retail availability and psychiatric conditions could be due to the use of higher strength products, more frequent use, or self-medication among adolescents with preexisting psychiatric conditions.

Retail bans and limits on storefront retailer density are common in California (Padon et al., 2022), but further studies are needed to assess their protective effect on adolescent cannabis use and mental health. This study, based on insured Northern California adolescents, may not generalize to uninsured populations or those in other states. Limitations include potential underestimation of psychiatric disorders in EHRs, non-anonymous self-reported depression symptom data, and the inability to measure illegal market access or other potential confounders (e.g., community connectedness, civic engagement, commercial land use). Additionally, our cross-sectional design does not allow us to make causal inferences, and longitudinal studies are needed that examine the passage and implementation of state legalization and local policies over time.

Conclusions

Local bans on cannabis sales were associated with a lower prevalence of adolescent psychotic disorders, and greater retail availability was associated with a higher prevalence of psychotic, anxiety, and depressive disorders, and current depressive symptoms. Policies limiting retail density and access may reduce adolescent harm in the context of legalization and warrant further evaluation.

Author agreement

This manuscript is original, has not been published before, and is not currently being considered for publication elsewhere. We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us. We understand that the Corresponding Author is the sole contact for the Editorial process.

Declaration of interest

Dr. Campbell and Ms. Does have received support managed through their institution from the Industry PMR Consortium, a consortium of companies working together to conduct post-marketing studies required by the Food and Drug Administration that assess risks related to opioid analgesic use. All other authors declare no conflict of interest.

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Data availability statement

The data underlying this article are not available.

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