Health Behavior Research

Volume 8 | Number 1 Article 1

January 2025

Retail Availability of Delta-8 THC Near Schools, Fort Worth, Texas, 2021

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Recommended Citation

Kong, Amanda Y.; LoParco, Cassidy; Herbert, Lily; Yockey, Robert; and Rossheim, Matthew E. (2025) "Retail Availability of Delta-8 THC Near Schools, Fort Worth, Texas, 2021," *Health Behavior Research*: Vol. 8: No. 1. https://doi.org/10.4148/2572-1836.1280

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Abstract

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Keywords

cannabis, delta-8 THC, retail environment, built environment, youth and adolescents, inequities

Acknowledgements/Disclaimers/Disclosures

AYK has served as a paid expert consultant in litigation against the tobacco industry. No other authors declare conflicts of interest.

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ABSTRACT

Delta-8 THC (D8) is an intoxicating compound linked to poisonings and hospitalizations, and no federal laws prohibit its sale to minors. We examined retail D8 availability near public schools (n=231) in Fort Worth, Texas, where D8 sales are minimally regulated. Between September-October 2021, trained data collectors collected D8 availability data from 1,178 retailers with alcohol, tobacco, and/or consumable hemp licenses. We examined differences in product availability for retailers near (within 0.5 miles) schools vs. not near schools. There was a higher prevalence of retailers selling D8 near (vs. not near) schools (12.4% vs. 8.2%; chi-square test 5.84, $p<0.05$). Of the 231 public schools, 37.2% (n=86) had at least one D8 retailer nearby. Of the 86 schools with D8 retailers nearby, the cheapest products were for vaping (40.7%) and edibles (31.4%). There were school-level racialized and socioeconomic inequities in availability. Ongoing surveillance of D8 availability and laws are urgently needed.

Keywords: cannabis, delta-8 THC, retail environment, built environment, youth and adolescents, inequities

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INTRODUCTION

The 2018 United States (U.S.) Farm Bill defined *hemp* as cannabis and cannabis derivatives with ≤0.3% delta-9 tetrahydrocannabinol (THC) by dry weight, removing "hemp" from the definition of cannabis in the Controlled Substances Act (CSA) (*Hemp Production and the 2018 Farm Bill*, 2019). Because the Farm Bill focused on delta-9 THC, a policy loophole was created that effectively legalized the sales of hemp-derived THC products, aside from delta-9 THC (Kruger & Kruger, 2022).

One of these hemp-derived products is delta-8 THC, which is rapidly growing in popularity, especially in states with stricter cannabis use policies (Leas et al., 2022; Livingston et al., 2022). Delta-8 THC is one type of intoxicating cannabis product, and it only differs from delta-9 THC by the location of a double carbon bond: as such, the psychotropic properties of delta-8 THC are similar to, but may be less intense than, those of delta-9 THC (Kruger & Kruger, 2022). While evidence on the negative health consequences of delta-8 THC use are still being researched, its use has been linked to numerous poisonings and hospitalizations (*5 Things to Know about Delta-8 Tetrahydrocannabinol – Delta-8 THC*, 2022; Burgess et al., 2024). To date, there are no federal regulations around the manufacturing or sales of delta-8 THC, including no age requirements. The Food and Drug Administration reports they are working with

states and localities to monitor concerns (*5 Things to Know about Delta-8 Tetrahydrocannabinol – Delta-8 THC*, 2022), and some states have taken action by prohibiting the sales of delta-8 products (Gilbert, 2023; Leas, 2021; Rossheim et al., 2024)

With increasing availability and awareness about delta-8 THC products, consumer use may also be increasing (Livingston et al., 2022; Livne et al., 2022). A 2023 nationally representative study found 11.4% of 12th graders reported delta-8 THC use, and use was higher in Southern regions and states without adult cannabis use legalized (Harlow et al., 2024). Additionally, previous research indicates that retail availability of cannabis dispensaries near schools is associated with student cannabis use (Bostean et al., 2023) and lower perceived harm (Firth et al., 2022). To the best of our knowledge, research has yet to examine the availability of delta-8 THC in proximity to school locations.

In Texas, delta-8 THC remains legal due to ongoing legal battles, and as of October 2, 2020, delta-8 THC retailers are required to register themselves and pay a $155 fee (*DSHS Accepting Applications to Manufacture or Sell Consumable Hemp Products*, 2020). The objective of this study was to examine delta-8 THC retail availability near schools through an exploratory pilot study in Fort Worth, Texas - a city and state with no legalized adult cannabis and a relatively restrictive medical cannabis program (*How to Get a Texas Medical Marijuana Prescription*, 2024).

METHODS

Study Sample

This study was determined to not be human subjects' research by the University of North Texas Health Science Center's Institutional Review Board. We assessed delta-8 THC retail availability by compiling a list of retailers (September 1, 2021) with an alcohol or tobacco and/or consumable hemp license from the Texas Alcoholic Beverage Commission, Comptroller and the Texas Department of State Health Services, respectively (N=3,084). These methods are described in further detail elsewhere (LoParco et al., 2024). Some store types included in the sample were dollar stores, convenience stores, gas stations, grocery stores, pharmacies, and smoke shops. We removed duplicate locations (n=1,093) and locations outside of Fort Worth (n=102), resulting in a sampling frame of 1,889 retailers. A total of 1,178 (62.4%) retailers listed phone numbers and provided data.

Measures

Retail Delta-8 THC Availability Audits

From September - October 2021, trained data collectors called each location a maximum of three times to assess delta-8 THC product availability, including 1) delta-8 THC retail availability (yes/no); if yes, 2) retail availability of delta-8 THC edibles and smoking/vaping products (yes/no for each), and 3) the least expensive way to purchase delta-8 THC (product type). Two study authors (AYK, CRL) independently coded the least expensive product into three category types with no disagreements: edible, combustible smoking, or vaping.

School-Level Sociodemographic Characteristics

We downloaded publicly accessible 2021-2022 National Center for Education Statistics school address and school-level student racial and socioeconomic sociodemographic data for all public schools in Fort Worth, Texas (n=264). We geocoded schools and omitted duplicate records (n=2), any schools that had no students or completely missing student

data (n=7), and schools outside Fort Worth municipal boundaries (n=24), resulting in a total of 231 eligible schools. We spatially joined data from the retail availability audits with each school location.

Statistical Analysis

We used R (*tidyverse* and *sf* packages) to spatially calculate the number of retailers within a 0.5-mile Euclidean buffer of public schools. We use 0.5 miles as this is a plausible walking distance for students around schools, similar to previous research assessing school retail exposure to other commercial products (e.g., food (Zenk & Powell, 2008), tobacco (Adams et al., 2013). We used R and SAS to calculate differences in the availability of delta-8 THC near schools and by school-level sociodemographic characteristics, using both schools and retailers as the units of analysis.

RESULTS

School-Level Analysis

Of the 231 public schools in Fort Worth, 37.2% (n=86) had a nearby (within 0.5 miles) retailer selling any type of delta-8 THC product. There was an average of 1.43 delta-8 THC retailers (range: 1-4) within 0.5 miles of a school (herein referred to as 'near schools'). In this sample, 26.8% and 35.1% of schools had a retailer nearby that sold delta-8 THC edibles or smoking/vaping products, respectively (Table 1).

Of the 86 schools with delta-8 THC retailers nearby, the cheapest product tended to be for vapor products (40.7%), followed by edibles (31.4%), and combustible smoking products (27.9%). Compared to schools without a delta-8 THC retailer nearby (n=145), schools with delta-8 THC retailers nearby had a higher percentage of students receiving free or reduced lunch (69.1% vs 83.6%; t-test, -5.03; $p<0.001$) and Hispanic/Latino students (46.7% vs. 60.9%; t-test, -4.242; $p<0.001$) and a lower percentage of White (19.5% vs 10.4%; t-test, 4.37; $p<0.001$) and Asian American and Native Hawaiian/Pacific Islander (AANHPI) students (3.8% vs 2.0%; t-test, 3.75; $p<0.001$).

Retailer-Level Analysis

A total of 1,178 retailers provided data on whether they sold delta-8 THC products; of these, 540 (45.8%) retailers were near schools (Table 2). Most retailers near schools (regardless of delta-8 THC sales) had only an alcohol license (270/540, 50.0%) or both alcohol and tobacco licenses (197/540, 36.4%) as compared to tobacco license only (57/540, 10.6%) or consumable hemp (16/540, 3.0%) with or without an alcohol/tobacco license (not shown). This same pattern held for retailers not near schools.

A greater percentage of retailers near schools sold delta-8 THC products (67/540, 12.4%) vs. retailers not near schools (52/638, 8.2%; chi-square test, 5.84, $p=0.02$). Additionally, a greater percentage of delta-8 THC retailers near schools sold edibles as their cheapest product (18/55, 32.7%) than those not near schools (12/42, 28.6%). No other retailer-level differences were statistically significant.

DISCUSSION

In Fort Worth, Texas, more than one-third of public schools had at least one delta-8 THC retailer within 0.5 miles. Additionally, a greater percentage of retailers near schools sold delta-8 THC (vs. retailers not near schools). We found that nearly 1 in 3 schools had a retailer selling combustible smoking, vaping, or edible delta-8 THC products within 0.5 miles. Exposure to cannabis

Table 1. Availability of delta-8 THC products and student sociodemographic characteristics of schools (n=231) within 0.5 miles of delta-8 THC retailers in Fort Worth, Texas, 2021

Variable	Schools without delta-8 THC nearby (n=145)	Any delta-8 THC Product (n=86)	T-test[a]	Edibles	Combustible Smoking or Vaping Products	Cheapest Product Type (n=86)		
						Edible	Smoke	Vape
Retailer Sold (n=231), No. (%)	NA	86 (37.2)	NA	62 (26.8)	81 (35.1)	27 (31.4)	24 (27.9)	35 (40.7)
School-Level Sociodemographic Characteristics, Mean (SD)								
% Free or Reduced Lunch	69.1 (25.2)	83.6 (17.9)	-5.03***	80.4 (20.0)	82.8 (18.1)	79.7 (19.4)	79.7 (23.1)	87.9 (10.0)
% White	19.5 (17.4)	10.4 (13.9)	4.37***	11.8 (14.9)	10.8 (14.2)	12.3 (14.4)	11.4 (15.1)	7.3 (9.6)
% Black or African American	26.2 (17.4)	24.5 (21.0)	0.67	25.6 (20.8)	24.8 (21.2)	25.2 (22.4)	23.6 (22.4)	24.0 (18.4)
% AANHPI	3.8 (4.5)	2.0 (3.0)	3.75***	2.2 (3.3)	2.0 (3.1)	1.3 (1.9)	1.3 (1.9)	1.9 (3.5)
% AI/AN	0.2 (0.3)	0.2 (0.2)	1.37	0.2 (0.2)	0.2 (0.2)	0.1 (0.2)	0.2 (0.3)	0.2 (0.2)
% Hispanic or Latino	46.7 (21.0)	60.8 (26.3)	-4.24***	57.7 (25.4)	59.9 (26.4)	58.7 (24.8)	61.0 (29.7)	65.1 (24.2)

Note: We defined delta-8 THC edibles as delta-8 THC products that could be consumed by eating or drinking; Race variables were of any ethnicity (i.e., Hispanic or Latino or non-Hispanic or Latino)

[a]We fit two-sample t-tests (Satterthwaite) to test differences between sociodemographic characteristics of schools with any delta-8 THC products sold nearby (within 0.5 miles) vs. the sociodemographic characteristics of schools with no delta-8 THC products nearby (*p<0.05, **p<0.01, ***p<0.001).

NA, Not Applicable
AANHPI, Asian American and Native Hawaiian/Pacific Islander
AI/AN, American Indian/Alaska Native

Table 2. Count and percentage of retailers (n=1,178) selling delta-8 THC products within 0.5 miles of schools, Fort Worth, Texas, 2021

Delta-8 THC Product Types Sold	All retailers (n=1,178)	Retailers within 0.5 miles of schools (n=540)	Retailers not within 0.5 miles of schools (n=638)	Chi-square Test[a]
	No. (%)	No. (%)	No. (%)	
Any	119 (10.1)	67 (12.4)	52 (8.2)	5.84*
Edibles	87 (7.4)	46 (8.5)	41 (6.4)	1.87
Combustible smoking or vaping	111 (9.4)	60 (11.1)	51 (8.0)	3.33
Cheapest product type[b]	**n=97**	**n=55**	**n=42**	
Edible	30 (30.9)	18 (32.7)	12 (28.6)	0.22
Combustible smoking	25 (25.8)	14 (25.5)	11 (26.2)	0.00
Vaping	42 (43.3)	23 (41.8)	19 (45.2)	0.06

Note: We defined delta-8 THC edibles as delta-8 THC products that could be consumed by eating or drinking.
[a]We fit chi-square tests to test differences in delta-8 THC product availability for retailers within 0.5 miles (vs. not within 0.5 miles) of schools (*$p<0.05$).
[b]The sample size differs for cheapest product type as there were missing values.

marketing may be higher for youth attending schools with delta-8 THC retailers nearby, and exposure to cannabis marketing may be associated with more cannabis use and cannabis use disorder (Trangenstein et al., 2021). Texas requires medical dispensaries to be at least 1,000 feet away from a school, yet results from our study indicate that many retailers *not* classified as dispensaries are selling delta-8 THC near schools ("Compassionate Use / Low-THC Cannabis Program Administrative Rules," 2017)," and it is plausible that this may be occurring in other states.

Compared to retailers not near schools, edibles were more prevalent as the cheapest delta-8 THC product for retailers near schools. Using cannabis via edibles has increased over time, including among a national sample of 12th graders: 32.0% used in 2015 compared to 39.5% in 2018 (Patrick et al., 2020). Given increased edible use prevalence nationally and that youth are a price-sensitive group, our finding that cheap delta-8 THC edibles are available near schools speaks to the need for surveillance on the retail availability, marketing, and price of delta-8 THC edibles.

Our study also documents inequities in the availability of delta-8 THC near schools, which could contribute to some sociodemographic inequities in adolescent cannabis use prevalence (Peters et al., 2018). In a supplementary analysis (Supplement A), we examined the average school-level sociodemographic characteristics for retailers that we could not contact and fell within 0.5-miles of a school (n=384). We found the distribution of sociodemographic characteristics to be most like schools with contacted retailers nearby that sold delta-8 THC (vs. schools that did not have delta-8 THC retailers nearby), suggesting that school-level inequities in Fort Worth may be underestimated.

There are limitations to this study. Our sample was limited to Fort Worth retailers with tobacco, alcohol, and/or consumable hemp licenses, and findings may not be generalizable to other places. Given there are minimal regulations around the sales of delta-8 THC in Texas, we did not account for retailers that may be selling these products without one of these licenses. Our study was also limited to retail stores, and online purchasing of delta-8 THC products may be another important avenue of availability, especially for youth given lack of age of verification systems (Egan et al., 2023; LoParco et al., 2024; Nali et al., 2023). Additionally, there were 63 schools with Euclidean buffers that extended beyond the Fort Worth municipal boundaries, so there may have been retailers that fell within these school buffers that were not included in the sample; however, the overall land area of buffers that extended beyond municipal boundaries was small (7.62 square miles total). Finally, we conducted phone surveys and were not able to confirm clerk responses through in-person store visits, and there were a fair number of retailers (n=711) that we could not contact.

IMPLICATIONS FOR HEALTH BEHAVIOR RESEARCH

The federal government and U.S. states are facing challenges with the design and regulation of the production and sales of delta-8 THC and other derived intoxicating cannabinoids (Rossheim et al., 2024). To the best of our knowledge, this is the first assessment of delta-8 THC sales near public schools and may signal to an emerging public health issue in other places. Given adolescent delta-8 THC use and increased reports of poisonings and hospitalizations (*5 Things to Know about Delta-8 Tetrahydrocannabinol – Delta-8 THC*, 2022; Burgess et al., 2024), the disproportionate availability of these

products being sold near schools in our sample is concerning. Ongoing surveillance of the availability, marketing, and pricing of these products is needed.

Localities, states, and public organizations have discussed various policy recommendations to address the proliferation of delta-8 THC and other intoxicating cannabis products, especially as retailers may be selling new types of these products in states with existing regulations (Rossheim et al., 2024). Some of these policy recommendations include refining federal language so that it would not exempt derived intoxicating cannabinoids from the CSA, leading to regulatory power over these products (National Academies of Sciences & Medicine, 2024), and some jurisdictions have prohibited their sales altogether, which has effectively reduced retail availability (Rossheim et al., 2024). For states that have legalized adult recreational and/or medical cannabis, further prohibiting the sales of intoxicating cannabis products within a certain distance of schools and youth-oriented facilities (e.g., parks), as has been done with cannabis dispensaries ("Compassionate Use / Low-THC Cannabis Program Administrative Rules," 2017), may also reduce youth exposure and access (National Academies of Sciences & Medicine, 2024). The present study underscores the importance of such regulations because these products may be disproportionately marketed and sold near schools with higher proportions of students from some racial and ethnic minority and lower income backgrounds, potentially exacerbating adolescent health inequities in cannabis use (Peters et al., 2018).

DISCUSSION QUESTIONS

What public health concerns are there surrounding the sales and marketing of delta-8 THC, especially when considering youth?

How is the sales of cannabis and delta-8 THC products near schools potentially related to youth use of these products?

Funding Sources: There are no funding sources to declare.

Contributors: AYK and MER conceptualized the research idea; AYK, CRL, and MER acquired the data; AYK, CRL, LH, and MER conducted data management; AYK and LH conducted formal analysis; AYK led the original drafting of the manuscript; all authors reviewed the manuscript, provided critical feedback, edited the manuscript, and approved its final submission.

Conflicts of Interest: AYK has served as a paid expert consultant in litigation against the tobacco industry. No other authors declare conflicts of interest.

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SUPPLEMENT A

Supplemental Table A. School-level sociodemographic characteristics of retailers that could not be contacted and were within 0.5 miles of a public school (n=384), Fort Worth, Texas, 2021

School-level Sociodemographic Characteristic	Mean (SD)
% Free or reduced lunch	80.9 (20.3)
% White	12.5 (15.9)
% Black or African American	26.1 (20.5)
% American Indian/Alaska Native	0.2 (0.2)
% Asian American and Native Hawaiian/Pacific Islander	2.1 (3.1)
% Hispanic or Latino	56.9 (25.0)