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Concentration of Cannabis and Tobacco Retailers in Los Angeles County, California: A Spatial Analysis of Potential Effects on Youth and Ethnic Minorities

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ABSTRACT. Objective: Cannabis and tobacco retailers are believed to cluster in areas with more racial/ethnic minorities, which could account for the disproportionate use of blunts in Black and Hispanic communities. The current study examined the spatial relationship between cannabis and licensed tobacco retailers in Los Angeles County, California, and assessed whether various neighborhood and business factors influenced the spatial patterning. **Method:** Generalized additive models were used to test the association between the location of cannabis retailers (N = 429) and their accessibility potential (AP) to tobacco retailers (N = 8,033). The covariates included cannabis licensure status, median household income, population density, percentages of racial/ethnic minorities and young adults (18–34), unemployment status, families living in poverty, minimum completion of high school/General Educational Development (GED) credential, and industrial businesses by census tract. **Results:** The location of cannabis retailers was significantly associated with AP in all adjusted models ($p < .005$). The percentage of racial/ethnic minorities, age (18–34 years), and nonlicensure of cannabis retailers, which were positively correlated with AP ($p < .05$), confounded the association between AP and cannabis retailer location. **Conclusions:** The concentration of unlicensed cannabis retailers and tobacco retailers in young and racially/ethnically diverse neighborhoods may increase access to and use of cigarillos for blunt smoking. Jurisdictions within Los Angeles County should consider passing ordinances requiring minimum distances between cannabis and tobacco retailers. (*J. Stud. Alcohol Drugs, 83,* 502–511, 2022)

LICENSED TOBACCO RETAILERS (LTRs) are concentrated in areas with more racial/ethnic minorities (Berg et al., 2018) and poorer neighborhoods (Farley et al., 2019; Schneider et al., 2005). Furthermore, greater product availability, targeted promotions, and low prices incentivize residents of such communities to purchase inexpensive combustible products like little cigars/cigarillos (LCCs) (Cantrell et al., 2013; Henriksen et al., 2017, 2018), which may increase tobacco use and tobacco-related health disparities. Berg and colleagues (2018) have argued that greater tobacco availability and targeted promotions toward racial/ethnic minorities may be mirrored in the emerging retail market for cannabis. Research is needed to identify communities that are disproportionately exposed to both tobacco and cannabis. In California, neighborhoods with cannabis retailers, regardless of licensure, had higher proportions of Black, Hispanic, and low-income residents compared with neighborhoods without cannabis retailers (Unger et al., 2020). Furthermore, neighborhoods with only unlicensed retailers had significantly higher proportions of racial/ethnic minorities compared with neighborhoods with only licensed retailers. Thus, the clustering of tobacco and cannabis retailers in poorer and racially/ethnically diverse areas may promote co-use of tobacco and cannabis.

Although previous studies have separately examined neighborhood demographics of tobacco and cannabis retailers, no study has investigated the spatial relationship of the two. This is warranted for two reasons. First, the spatial relationship may yield insights into whether cannabis and tobacco retailers are likely to engage in similar marketing practices or target specific communities. Second, most tobacco retailers sell products that are used for smoking blunts, such as LCCs and blunt wraps, which are cigar wrappings made of tobacco that are packed with cannabis. An estimated 24.2% of Black and 13.9% Hispanic adults use blunts daily compared with 9.1% of White adults (Mantey et al., 2021).

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Furthermore, 5.3% of Black, 4.3% of Hispanic, and 3.8% of White adolescents are estimated to have used blunts in the past month in the United States (Montgomery & Mantey, 2018). Such co-use of tobacco and cannabis is a public health concern because it is associated with greater risk for cannabis use problems (Fairman, 2015), mental health symptoms (Cohn et al., 2016; Ramo et al., 2012; Tucker et al., 2019), and other drug use (Mayer et al., 2020; Peters et al., 2014). LCCs have become increasingly popular over the years, likely as a function of low taxes, co-marketing with cannabis (Henriksen et al., 2018), and lack of federal regulations that allow flavored LCCs and small pack sizes at low cost (Delnevo et al., 2017; Kostygina et al., 2016). Tobacco retailers have taken advantage of these regulatory shortcomings in selling and marketing LCCs to residents of Los Angeles (LA) (Smiley et al., 2019); tobacco retailers located in areas with greater Black populations had significantly greater odds of selling and displaying exterior advertisements of LCCs. LCC exposure and availability at the local level may contribute to the disproportionate exposure and prevalence of blunt smoking among Black adults (Koopman Gonzalez et al., 2017; Timberlake, 2009), Black youth (Montgomery & Mantey, 2018), and Hispanics (Montgomery & Mantey, 2017).

Investigating the spatial relationship between cannabis and tobacco complements studies that have examined the correlation between macrolevel factors (i.e., cannabis policy) and LCC availability (Giovenco et al., 2018; Lipperman-Kreda et al., 2014). This study aims to investigate whether spatial patterns in tobacco accessibility from cannabis retailers exist and whether accounting for neighborhood and business factors explains the geographic patterning of tobacco accessibility. Although there are citing regulations for cannabis retailers (e.g., minimum distance requirements between retailers), there are no comparable regulations that consider the locations of both cannabis and tobacco retailers. If both retailers are clustered in vulnerable communities, this may explain the disproportionate co-use and exposure of tobacco and cannabis among racial/ethnic communities. This study could support rationale for passing minimum distance policies between tobacco and cannabis retailers to curb co-use–related health disparities. Furthermore, since LA County's population is diverse and comparable in size to U.S. state populations (Los Angeles Almanac, 2019), the findings have implications for counties and states that continue to legalize cannabis.

Method

Data sources and collection

Cannabis retailers. Addresses for licensed and unlicensed cannabis retailers were obtained from Pedersen and colleagues (2020). Information on all cannabis retailers in LA County was obtained to gather address data for licensed and unlicensed retailers. Building off procedures established in prior work (Pedersen et al., 2018), cannabis retailer address and license status were obtained from state- and city-level retailer databases and cannabis retailer websites to generate a list of retailers in LA County. Direct observations of cannabis retailer fronts were conducted to verify address and operational status (see Pedersen et al., 2020, for details). Four hundred thirty cannabis retailers were identified (162 licensed and 268 unlicensed) and operational in April 2019. Cannabis retailers were defined as businesses that sell medicinal and/or recreational cannabis products regardless of licensure status.

Licensed tobacco retailers. A list of LTRs operating within California was obtained from the California Department of Tax and Fee Administration. The list provides information on operating status, business type, and licensure of LTRs. Licensed and operational LTRs in California in April 2019 (N = 32,733) were used for the study to match the sampling period from Pedersen and colleagues (2020). All businesses in California that manufacture, distribute, and sell tobacco products (e.g., cigarettes, electronic delivery devices with nicotine, or any component of a tobacco product) require licenses and registration through the California Department of Tax and Fee Administration. LTRs were defined as individual/sole proprietor, partnered, or corporate-owned businesses who legally retail tobacco products. Wholesalers and distributors were not included in the study. Cannabis retailers and LTRs were geocoded using the Geographic Information System (GIS; Esri Inc., 2009). Among the 32,733 geocoded LTRs in California, 8,033 retailers (2,733 individual proprietors, 5,300 non-individual proprietors) were located within LA County. Unlicensed LTR data were not available.

Level II demographic and business characteristics. Demographic data of census tracts in LA (N = 1,945) were based on 5-year estimates from the 2014–2018 American Community Survey (https://www.census.gov/programs-surveys/acs). The following variables were extracted from the American Community Survey and chosen a priori based on the literature: percentage of households living under the federal poverty line (determined by past-12-month salary), percentage of individuals ages 18–34 years, percentage of unemployed individuals in the workforce (≥18 years), median household income (Redonnet et al., 2012), percentage of individuals who completed high school/General Educational Development (GED) credential level education or above (Lynskey & Hall, 2000), and percentage of racial/ethnic minorities (Unger et al., 2020) by census tract. Population density (population per square kilometer of census tract) was included to account for urbanization. Percentage of industrial businesses (classification 31–33 according to the North American Industry Classification System) operating in April 2019 by census tract were derived from the Los Angeles Office of Finance to account for potential locations of cannabis retailers (Thomas

& Freisthler, 2016, 2017). Extracted census tract and business data were linked to the cannabis retailer data. Cannabis retailers were the unit of analysis for the study.

Calculating accessibility

Cannabis retailer accessibility to tobacco retailers was determined using a derived function of accessibility potential (AP), a population-weighted measure of the summed inverse distance of all tobacco retailers within a 20-minute driving distance from each cannabis retailer. Accessibility generally pertains to opportunities one location provides in partaking in certain activities (Pirie, 1979; Vickerman, 1974; Weibull, 1980). The following equation was used to calculate AP for each cannabis retailer:

$$AP_i = \sum_j \left(\frac{1}{d_{ij}} \times \frac{1}{p_i}\right).$$

The subscript i of AP corresponds to a cannabis retailer, j corresponds to LTRs located within a 20-minute driving distance from the cannabis retailer, d is the Manhattan distance between the cannabis retailer and the respective LTR, and p is the population within a 20-minute driving distance from the cannabis retailer. Both j and p were derived using a 20-minute driving distance service area around the cannabis retailer using ArcGIS online services (https://maps.arcgis.com). The percentage overlap between the service area and all census tracts was multiplied by the population of the respective census tract and summed to obtain p. The distances between cannabis retailers and LTRs (d) were obtained by using ArcGIS PRO's Network Analysis tool (Esri Inc., 2019). The inverse of the population within the service area of the cannabis retailer was included in the equation to account for urbanization.

In this study, accessibility is defined as each cannabis retailer's access to tobacco; the higher the AP of a cannabis retailer, the more access it has to nearby LTRs. Although there is no literature guiding the selection of service areas, a 20-minute driving distance is commonly perceived as the maximum convenient driving time (Colabianchi et al., 2007; Kirtland et al., 2003) and thus is used as the boundary condition. Furthermore, Timberlake and colleagues (2021) found no observable differences between using smaller buffers and a 20-minute buffer.

Spatial analysis

Generalized additive modeling. A generalized additive model was used with the location of cannabis retailers as the predictor and AP as the criterion. The resulting generalized additive model can be used to predict AP for a continuous geographic area to observe areas with statistically significant changes in AP. A smoothing term with the latitude (X) and longitude (Y) of the cannabis retailers was used to model the locations for AP. Smoothing is dependent on the optimal span size and the percentage of data points that is being smoothed in the model and is determined by minimizing the Akaike information criterion (AIC) (Padilla et al., 2013; Webster et al., 2006). The Modgam package for the statistical software R (R Core Team, 2017) was used to determine the optimal span sizes for each model and covariates that best explain the spatial variation of AP. The following is the general model used for estimating local AP:

$$log\ AP\ [p(X,Y)] = S(X,Y) + \gamma Z$$

The left side of the model is the predicted logarithm-transformed AP at a specific point (X, Y). $S(X, Y)$ represents the optimal smoothing term of location. γ is the parameters associated with each covariate (Z) of interest (level II variables and cannabis licensure status). Data on AP were converted using a logarithm transformation to fit the assumption of homoscedasticity of variance. The anti-logs of AP values (i.e., back transformed) are presented in the results, tables, and figures for ease of interpretation. The crude model consists of our AP outcome and the smoothing term, indicating areas where there is high and low AP; the crude model indicates areas consisting of cannabis stores with significantly low or high accessibility to tobacco. The covariates in the adjusted models may explain some of the spatial variation observed in the crude maps. A prediction grid for AP was created to allow longitude and latitude to vary but keep covariates constant at the median value. Thus, the adjusted mapped AP represents changes only because of location. The study area was confined to metropolitan LA by excluding census tracts with sparse population data (e.g., Rocky Peak Park). Excluding these areas improves model stability and reduces edge effects that may bias the results (Vieira et al., 2008). One cannabis retailer in the far north of LA County was also excluded to reduce potential edge effects.

Association between location and accessibility potential. Testing whether AP is dependent on location can be done using a permutation test (Vieira et al., 2005), which randomly relocates cannabis retailers on the map and compares the deviance for models with the observed and random locations. The null permutation distribution was created by permuting the data 999 times. The observed deviance statistic was ranked among the permuted deviance statistics to determine the global p statistic. Areas of significantly low and high AP can be indicated on the map for models where the global statistic is less than the significance level of .05. This is done using a pointwise permutation test to identify areas on the map with statistically significant areas using the same permutations from calculating the global statistics (Webster et al., 2006).

Spatial confounding and model selection. A series of models were built to determine if added neighborhood and business characteristics explained the spatial relationship between cannabis retailer location and AP. Geographic variation in AP may be attributable to spatial confounding of the

TABLE 1. Census tract characteristics of the 430 cannabis retailers located in LA County, CA and operational in the year 2019

Variable	*Mean*	*Median*	*SD*	Minimum	Maximum
Accessibility potential	0.32	0.09	1.26	0.01	18.53
Racial/ethnic minorities	75.33	86.40	26.12	10.90	100
Median household income	$58,858	$52,581	$25,684.41	$12,135	$208,438
Population density[a]	5,041	4,416	3,112.14	1	19,501
Individuals ages 18–34	28.08	27	7.95	0	84
Unemployed	7.31	6.88	3.28	0	21.27
Families living under poverty line	16.37	14.60	11.43	0	76.50
Completed high school/ GED or higher	55.22	52.73	16.54	22.81	88.37
Industrial businesses	4.70	3.21	4.49	0	22.35

Notes: The following variables are represented as percentages: racial/ethnic minorities, individuals ages 18–34, unemployed, families living under poverty line, completed high school/GED or higher, and industrial businesses. GED = General Educational Development credential. [a]Population density unit is population per km^2.

association between location and AP. A spatial confounder is a characteristic that is associated with both location and AP. Spatial confounding was determined by visually comparing crude and adjusted maps with each other and observing general attenuation (decrease of AP range). If adding a covariate changed the observed spatial patterns and decreased the map ranges, then the introduced covariate would explain some of the relationship between AP and cannabis retailer location. An additive model was chosen based on the AIC. For each model selection, we first examined the univariate associations between the covariates and AP using linear regression. Then, covariates were added to the crude model in descending order of statistical significance determined from the univariate models. Variables were retained only if their inclusion minimized the AIC. The variables included in the final model may explain the spatial confounding between the location of cannabis retailers and AP. We also present the effect estimates in the final model and mapped predicted AP for all adjusted models to display associations with location.

Results

Descriptive statistics and univariate analysis

Cannabis retailers had a median of 1,680 LTRs (*SD* = 690.97, minimum = 69, maximum = 3,251) located within a 20-minute driving distance. Among the 1,945 census tracts in the metropolitan LA area, 296 distinct census tracts contained at least one cannabis retailer (see Table 1 for further descriptive statistics). Distributions of all retailers are shown in Figure 1.

Most coefficients from all analyses are presented using a back-transformation multiplied by 50 for ease of interpretation (see footnotes in Table 2 for equations used to report effect sizes). Effect sizes for population density, median household income, and cannabis licensure status were modified for ease of interpretation (see footnotes in Table 2). For the univariate analyses, the percentage of racial/ethnic minorities, %ΔAP: 38.06, $t(427) = 3.55$, $p < .001$; population density, %ΔAP: 5.30, $t(427) = 3.39$, $p = .001$; percentage of individuals ages 18–34, ΔAP: 139.80, $t(427) = 2.92$, $p = .004$; percentage of families living in poverty, %ΔAP: 125.83, $t(427) = 3.94$, $p < .001$; percentage of industrial businesses, %ΔAP: 187.60, $t(427) = 1.98$, $p = .049$; and lack of cannabis license, %ΔAP: 28.22, $t(427) = 2.53$, $p = .012$; were positively and significantly associated with AP (Table 2). Median household income, %ΔAP: -7.38, $t(427) = -4.16$, $p < .001$; and percentage of individuals who completed high school/GED or higher, %ΔAP: -33.66, $t(427) = -2.85$, $p = .005$; were negatively and significantly associated with AP. The percentage of unemployed individuals in the workforce was not associated with AP. Last, all covariates had a variance inflation factor less than 5.

Final model selection and spatial analysis

The covariates in descending order of statistical significance were median household income, percentage of families living in poverty, percentage of racial/ethnic minorities, population density, percentage of individuals ages 18–34, percentage of individuals who completed high school/GED education or higher, cannabis license status, and percentage of industrial businesses. All significant variables were subsequently added to the crude model in the aforementioned order to test for spatial confounding. Only covariates that reduced the AIC from the previous respective model were included (Table 3). The final model included the percentage of racial/ethnic minorities, percentage of individuals ages 18–34, and licensure status. Furthermore, the global test for location was statistically significant for all adjusted models (p = .001 or < .001), indicating that cannabis retailer location is significantly associated with AP (Webster et al., 2006).

In the crude model with only location as a predictor, AP was significantly increased near southwest metropolitan LA (e.g., Torrance) and decreased in the midwest (e.g.,

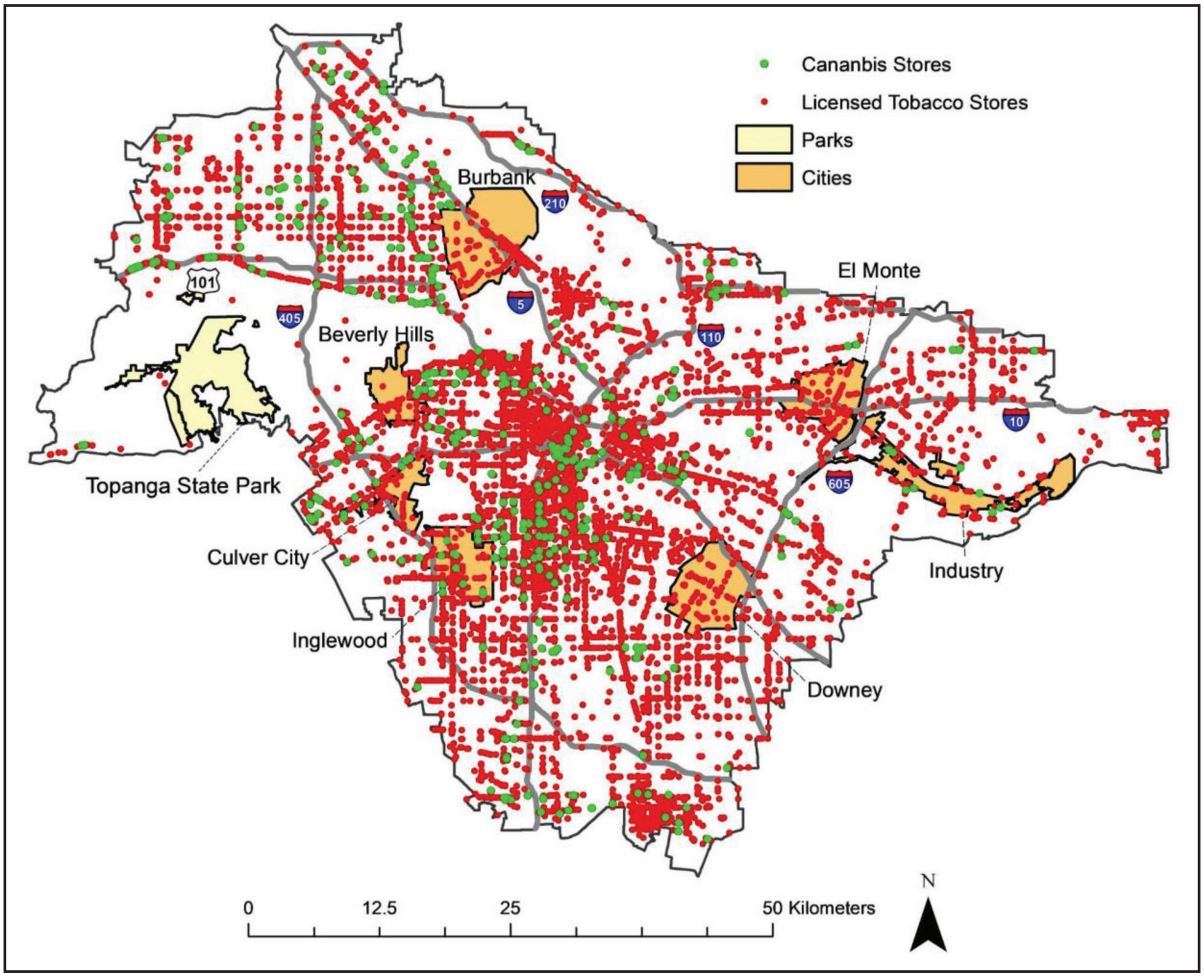

Figure 1. Spatial distribution of cannabis and licensed tobacco retailers in metropolitan LA County area. *Note:* Red points represent licensed tobacco retailers and green points represent cannabis retailers active in April 2019.

Santa Monica), northwest (e.g., Porter Ranch), and northeast metropolitan LA (e.g., Pasadena) areas (Figure 2). There was spatial confounding by racial/ethnic minorities in the significant area of low AP in west LA county (e.g., Santa Monica and Porter Ranch) (Supplemental Figure A). In the final model, introducing young adults and licensure status further reduced the overall AP ranges compared with the crude model (Table 3). However, the spatial pattern of the final model remained relatively the same compared with the model with just racial/ethnic minorities (Supplemental Figure A).

Multivariate analysis of final model

Effect estimates from the final model were examined to determine adjusted associations with AP. The percentage of racial/ethnic minorities (%ΔAP: 31.49, $z = 2.67$, $p = .008$), individuals ages 18–34 (%ΔAP: 98.91, $z = 2.44$, $p = .015$), and nonlicensure (%ΔAP: 22.68, $z = 2.01$, $p = .004$) were all positively associated with AP.

Discussion

The present study contributed to the limited research on the spatial relationship between tobacco and cannabis retailers. Results indicate that the cannabis retailer location was significantly associated with accessibility to tobacco retailers, and identified percentage of racial/ethnic minorities, percentage of individuals ages 18–34, and licensure of cannabis retailers as confounders of the association. This suggests that customers of unlicensed cannabis retailers located in younger and diverse neighborhoods have more access to tobacco retailers, which may encourage co-use in their communities. Co-use has been associated with more cannabis use problems (Fairman, 2015), mental health symptoms (Cohn et al., 2016; Ramo et al., 2012; Tucker et al., 2019), and other drug use (Mayer et al., 2020; Peters et al., 2014), which makes examining the spatial relationship between cannabis and tobacco retailers important for public health.

Within LA city, where 40% of the county population live, cannabis retailers are required to be located on a zone

Table 2. Estimates from univariate models and the multivariate final model in order of descending univariate statistical significance

	Univariate		Multivariate final model		
Variable	%ΔAP[a]	p	Coefficient	%ΔAP[a]	p
Median household income	-7.38%[b]	<.001	–	–	–
Families living under poverty	125.83%	<.001	–	–	–
Racial/ethnic minorities	38.06%	<.001	0.002	31.49%	.008
Population density	5.30%[c]	.001	–	–	–
Individuals ages 18–34	139.80%	.004	0.006	98.91%	.015
Completed high school/ GED or above	-33.66%	.005	–	–	–
Licensure status (unlicensed)	28.22%[d]	.012	0.089	22.68%[d]	.044
Industrial businesses	187.60%	.049	–	–	–
Unemployed individuals	189.44%	.148	–	–	–

Notes: The following variables are represented as percentages: families living under the poverty line, racial/ethnic minorities, individuals ages 18–34, completed high school/GED or higher, industrial businesses, and unemployment. Unit for population density is population per km^2. Coefficients in the multivariate model were rounded to the thousandths place. GED = General Educational Development credential. [a]Percentage change of accessibility potential (AP) per 50% point increase in the independent variable (%ΔAP) was calculated by using the following equation: $[(10^{\text{coefficient} * 50}) - 1] * 100$; [b]percentage change in AP for $10,000 increase in median household income; [c]percentage change in AP for every 1,000 increase in population per km^2; [d]percentage change in AP from licensed to unlicensed for cannabis retailers was calculated using the equation: $[(10^{\text{coefficient}}) - 1] * 100$.

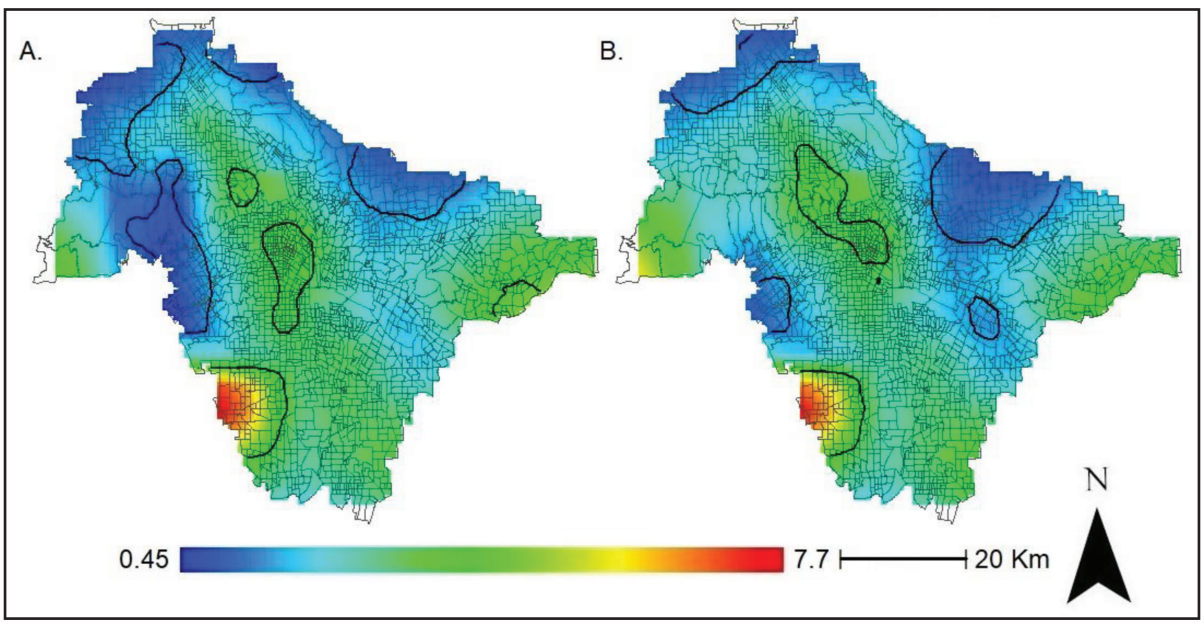

Figure 2. Spatial analysis of accessibility potential (AP) for crude and final general additive models. *Note:* (A) Crude model (only includes location of cannabis retailers as predictor for AP) and (B) final model with percentage of racial/ethnic minorities, percentage of individuals ages 18–34, license status, and location as predictors for AP.

parcel that is at least 700 feet from sensitive locations (e.g., schools, parks) and another cannabis retailer (City of Los Angeles Department of Cannabis Regulation, n.d.). Previous research found that even when accounting for the availability of commercial property and other citing requirements, there were more cannabis retailers in neighborhoods experiencing deprivation in Portland, OR (Firth et al., 2020), and in communities with higher proportion of Black residents compared with Asian and Hispanic residents (Thomas & Freisthler, 2017). These findings are relevant to our study because areas with cannabis retailers that were proximal to tobacco retailers had higher concentrations of racial/ethnic

Table 3. Generalized additive models on effect of location and accessibility potential based on decreasing AIC criterion. Variables of interest were added to the crude model in order of decreasing univariate statistical significance. BIC criteria for each additive model are included for reference.

Model	Span	Global *p* value	AIC	BIC	AP ranges
Crude log AP, location only	0.15	<.001	466.19	482.43	0.45–7.72
Racial/ethnic minorities + location	0.15	.001	465.70	486.01	0.52–8.07
Racial/ethnic minorities + individuals ages 18–34 + location	0.15	.002	464.29	488.66	0.53–7.72
Racial/ethnic minorities + individuals ages 18–34 + license status + location[a]	0.15	.002	462.33	490.76	0.52–7.49

Notes: The following variables are percentages by census tract: racial/ethnic minorities and individuals ages 18–34. AIC = Akaike information criterion; BIC = Bayesian information criterion; AP = accessibility potential. [a]Final model of the relationship between cannabis retailer location and accessibility potential that minimizes the AIC.

minorities. Because of historic redlining practices and racial segregation within LA county (Smiley et al., 2019), racialized people are more likely to live in areas with low levels of city investment and more commercially zoned property. This inequity predisposes racial/ethnic minorities to live near businesses that may be detrimental to their health or where municipal oversight is neglected.

The percentage of racial/ethnic minorities was the strongest confounder of cannabis retailer location and accessibility to tobacco, which could potentially explain the disproportionately higher rates of blunt use in neighborhoods with more Black adults (Koopman Gonzalez et al., 2017; Timberlake 2009), Black youth (Montgomery & Mantey, 2018), and Hispanics (Montgomery & Mantey, 2017). However, it should be noted that the northern portion of the significantly low AP cluster in west LA contains public parks (e.g., Topanga State Park). Thus, the observed low AP may be partially attributable to noncommercial land use. The percentage of younger adults was also associated with greater accessibility to tobacco retailers, which could partially explain the higher co-use use of cannabis and tobacco among young adults compared with other age groups (Cullen et al., 2011; Schauer et al., 2015), and may also partially explain the peaking of substance use during young adulthood (Park et al., 2006). Co-use may compound with other health outcomes—such as mental health problems, suicide, vehicle accidents, and crime—among younger adults (Park et al., 2006).

Cannabis licensure also confounded the spatial relationship, suggesting that high rates of co-use of cannabis and tobacco in some neighborhoods may be attributable in part to unlicensed cannabis retailers having more access to tobacco retailers. However, it should be noted that introducing young adults and licensure status only decreased the overall AP range in LA County, but the spatial pattern remained consistent. The two variables may not be strong confounders of AP, but their inclusion results in a statistically lower AP near the city of Downey. The persisting spatial pattern of AP in the final model is indicative of the presence of other unknown confounders spatially related to cannabis retailer location and AP. Nonetheless, the current findings support other studies where unlicensed retailers were disproportionately located in neighborhoods with more racial/ethnic minorities (Unger et al., 2020).

Having unlicensed cannabis retailers disproportionately located in younger and racially/ethnically diverse neighborhoods with higher access to tobacco may harm the health of the community. Relative to licensed retailers, unlicensed cannabis retailers are more likely to allow onsite consumption of cannabis and sell cheaper products that are attractive to youth, which could promote underage use (Lee et al., 2016; Nicholas et al., 2021), and sell significantly cheaper products, which may encourage young people and/or other vulnerable groups to visit more frequently (Goldstein et al., 2020). Findings from this study suggest that the same vulnerable groups may also have greater access to tobacco.

Moreover, a previous study investigating dispensaries in California found that retailers are more likely to be in areas with more alcohol retailers (Morrison et al., 2014), and racial/ethnic minority adolescents are more likely to live in areas with denser concentrations of alcohol retailers (Romley et al., 2007). Given the current study's findings, it could be suggested that racial/ethnic minority adolescents and young adults are also disproportionately exposed to alcohol, cannabis, and tobacco and thus are subsequently encouraged to engage in polysubstance use. Exposure to cannabis (via retailers or advertisements) may also continue to increase for these populations, as the market for cannabis may not be fully saturated compared with alcohol outlets (Gruenewald, 2008; Morrison et al., 2014).

Strengths and limitations

To our knowledge, this study is one of the first to investigate the accessibility of tobacco from cannabis retailers and how it is associated with different neighborhood demographic and business characteristics; however, some limitations should be considered. First, the effects of different zoning laws in LA County were considered but did not yield detectable variation in preliminary analyses. Second, the cross-sectional design of the study limits the ability to make temporal inferences about the relationships between demographic or business factors with AP. Moreover, causal inferences on the individual level cannot be made because of the ecological design. Next, AP measures for cannabis retailers may be underestimated, as data on unlicensed tobacco retailers were unavailable. Last, the presence of significant AP clusters in the adjusted model is indicative of other unknown variables that have not been identified or tested in our study.

Despite these limitations, the current study indicated that the location of cannabis retailers is associated with accessibility to tobacco retailers, and racial/ethnic minorities, younger adults, and licensure of cannabis retailers confounded the association. This study also provides regional and microlevel implications; since LA County currently has the largest legal cannabis market in the United States, it provides the ability to observe smaller spatial variations across a larger area. Analyzing larger scale spatial data tends to mask the variability within large areas, which could distort estimates of accessibility (Bryant & Delamater, 2019; Omer, 2006). Understanding the spatial relationship between tobacco and cannabis retailers will help assist substance use prevention advocates in curbing the uptake of co-use in vulnerable populations. The results of our study could provide a rationale for passing zoning ordinances pertaining to cannabis and tobacco retailers in LA County and other parts of the country (Silver et al., 2020).

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Conflict-of-Interest Statement

No conflicts are declared by the authors.

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