

Egocentric Network Characteristics and Cannabis Use in a Sample of Young Adult Medical Cannabis Patients and Nonpatient Users

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ABSTRACT. Objective: Social factors play an important role in young adults' substance use behaviors, but little is known about how egocentric social network factors are related to young adults' cannabis use. Young adults also report medicinal and recreational uses of cannabis, which may alter the strength of these relationships. Therefore, medical cannabis patient status and medicinal/recreational orientation toward cannabis were examined as moderators of these relationships. **Method:** Young adult medical cannabis patients ($n = 182$) and nonpatient users ($n = 157$) were surveyed in Los Angeles in 2015–2016 about their cannabis use, orientation (medicinal and/or recreational), and egocentric networks (cannabis use network size, social support network size, descriptive and injunctive norms). Regression models examined associations between network characteristics and past-90-day use and problematic use, and tested interactions between network characteristics and both patient

status and cannabis use orientation. **Results:** Only descriptive norms (adjusted incidence rate ratio [aIRR] = 1.19, 95% confidence interval [CI] [1.06, 1.33]) were associated with more frequent use, but not problematic use. Descriptive norms interacted with cannabis use orientation: descriptive norms were positively associated with cannabis use days among medicinally oriented users (aIRR = 1.22, 95% CI [1.02, 1.46]). However, this relationship was stronger for recreationally oriented users (aIRR = 1.62, 95% CI [1.31, 2.01]). No interactions were found predicting problematic use. **Conclusions:** Descriptive cannabis use norms among one's personal network members are an important variable predicting young adults' cannabis use, but not problematic use. Perceived descriptive norms may be a stronger motivator to use for recreational users than medicinal users. (*J. Stud. Alcohol Drugs*, 83, 802–811, 2022)

APPROXIMATELY 23% OF U.S. young adults ages 18–25 reported past-month cannabis use in 2019 (Substance Abuse and Mental Health Services Administration [SAMHSA], 2020). In California, medical cannabis has been legal since 1996, whereas recreational cannabis use for adults age 21 and older was legalized on November 9, 2016. Young adults commonly use cannabis medicinally for anxiety, depression, sleep, relaxation and tension relief, and pain (Hoffenberg et al., 2018; Lankenau et al., 2018; Patrick et al., 2016; Rotermann & Pagé, 2018; Smith et al., 2019). Moreover, both medical cannabis patients and nonpatient users report using cannabis recreationally (Corroon et al., 2017; Morean & Lederman, 2019; Rotermann & Pagé, 2018; Schauer et al., 2016; Smith et al., 2019). Although recent studies report that young adult medical cannabis patients report more frequent and problematic cannabis use (Hum-

mer et al., 2021; Tucker et al., 2019), self-reported medicinal and/or recreational use are also important to assess, given that one's orientation toward cannabis may be independent of patient status (Choi et al., 2017; Fedorova et al., 2019; Pacula et al., 2016; Roy-Byrne et al., 2015; Sexton et al., 2016; Smith et al., 2019; Wadsworth et al., 2020).

Social network factors associated with young adult cannabis use

In addition to self-reported medicinal or recreational motives for use, social factors such as the composition of one's personal (egocentric) social network are strongly associated with young adults' substance use (Knox et al., 2019; Rinker et al., 2016; Valente et al., 2004). Social network theory assumes that focal individuals (egos) are embedded within social structures made up of connections to other individuals (alters) who may be important sources of influence and support (Perry et al., 2018). Systematic reviews of studies using social network analysis conclude that greater exposure to substance-using peers is associated with greater use of a variety of substances among young adults (Knox et al., 2019; Rinker et al., 2016). However, much of this literature has been conducted with college students and has largely focused on alcohol use. In one recent study involving young

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men who have sex with men, the size of one's drug-using network was positively associated with cannabis use frequency (Janulis et al., 2019).

A parallel body of research has shown that perceived social norms, such as descriptive norms (perceived prevalence of cannabis use) and injunctive norms (perceived approval of cannabis use), are positively related to cannabis use and related problems among young adult college students (Arbour-Nicitopoulos et al., 2010; Neighbors et al., 2008). However, these studies often do not take into account more structural measures, such as the size of one's cannabis-using network. This is important, as it is unknown whether perceived social norms better explain young adults' cannabis use over and above how many people a young adult uses cannabis with. Recent research suggests that perceived substance use norms are a more important predictor of an ego's substance use than the "actual" self-reported substance use of alters (DiGuseppi et al., 2018), calling for the need to incorporate both individual perceptions and more "objective" social network measures.

Besides exerting social influence via network exposure or perceived norms, network members can be an important source of social support (Holt-Lunstad & Uchino, 2015). However, the supportive role of network members has rarely been investigated in studies of young adult cannabis users. One study reported that college students' perceived closeness toward their friends was negatively associated with anxiety and depressive symptoms but positively associated with cannabis use (Mason et al., 2014), perhaps highlighting how cannabis use can serve a social bonding function. In contrast, Janulis et al. (2019) found that after accounting for the size of young men's drug use networks, the social support network size had an inverse relationship with cannabis use both cross-sectionally and over time. These seemingly conflicting results call for more research on the relationship between social support and young adults' cannabis use.

Although prior research shows strong support for social network measures as predictors of cannabis use among young adults, research has yet to investigate whether these relationships differ for young adult medical cannabis patients and nonpatient users (or those who endorse a more medicinal, rather than recreational, orientation toward cannabis). Social support may be especially important for young adults who use cannabis medicinally since supportive network members can serve as a buffer against the stress associated with a medical condition (Cohen & Wills, 1985), potentially reducing young adults' reliance on the use of cannabis to cope with their medical condition. Given that a greater proportion of medical cannabis patients versus nonpatient users report medical reasons for use (Lankenau et al., 2018), medicinally oriented users may be less motivated by social factors. Therefore, social network influences (i.e., cannabis use network size, descriptive and injunctive norms) may be weaker predictors of cannabis use for medical cannabis

patients (or those who endorse a more medicinal, rather than recreational, orientation toward cannabis).

Study aims and hypotheses

The present study had two primary aims. First, we investigated relationships between egocentric network characteristics and cannabis use outcomes (number of cannabis use days and problematic use). We hypothesized that descriptive and injunctive norms, as well as cannabis use network size, would be positively associated with both cannabis use days and problematic use. We also hypothesized that social support network size would be negatively associated with cannabis use days and problematic use. Our second aim was to examine whether such relationships differ for medical cannabis patients (vs. nonpatients) and medicinally versus recreationally oriented users. Therefore, we examined both cannabis patient status and self-reported medicinal and/or recreational use as moderators of the associations between egocentric network measures and cannabis use outcomes. Given the lack of previous research in this area, this aim was exploratory.

Method

Participants

Participants were recruited into the longitudinal cohort Cannabis, Health & Young Adults (CHAYA) study if they satisfied the following eligibility criteria: (a) were 18 to 26 years old; (b) used cannabis at least four times within the past 30 days; (c) were able to speak and read English; (d) resided in the Los Angeles metro area; (e) had a current medical cannabis recommendation issued in California (medical cannabis patients) or had never had a medical cannabis recommendation (nonpatient users). Originally, medical cannabis patients were oversampled, resulting in a sample that was composed of just over half (53.7%) who were current medical cannabis patients. All study materials and procedures were approved by the institutional review boards at Children's Hospital Los Angeles and Drexel University.

Procedures

The present study uses follow-up data from the Wave 2 survey of a study involving cannabis-using young adults in Los Angeles, California ($N = 339$). The sample was originally recruited in 2014–2015, but social network measures were introduced in the Wave 2 survey in 2015–2016. All of the data in the present study were collected before cannabis was legalized for adult recreational use in the state of California (November 2016). The sample was recruited using targeted and chain referral sampling methods (Biernacki & Waldorf, 1981; Watters & Biernacki, 1989). Targeted sam-

TABLE 1. Participant (ego) characteristics ($N = 339$)

| Variable | Medical cannabis patients ($n = 182$) M (SD) or n (%) | Nonpatient users ($n = 157$) M (SD) or n (%) | Group diff. χ^2 (df) or t (df) |
|--|--|---|---|
| Age, in years (range: 19–27) | 21.4 (2.3) | 21.0 (2.6) | -1.6 (337) |
| Male (sex at birth) | 131 (72%) | 94 (60%) | 5.5 (1)* |
| Race/ethnicity | | | 4.9 (4) |
| Non-Hispanic African American | 27 (15%) | 36 (23%) | |
| Non-Hispanic White | 49 (28%) | 37 (24%) | |
| Non-Hispanic Asian/Pacific Islander | 5 (3%) | 8 (5%) | |
| Non-Hispanic Native American | 0 | 0 | |
| Non-Hispanic multiracial | 11 (6%) | 9 (6%) | |
| Hispanic/Latinx | 85 (48%) | 66 (42%) | |
| Cannabis use orientation (averaged) | 3.0 (1.1) | 2.5 (1.1) | -4.1 (322)*** |
| Exclusively recreational (1) | 15 (8%) | 35 (24%) | 19.9 (4)** |
| Primarily recreational (2) | 50 (28%) | 41 (28%) | |
| Equally medicinal/recreational (3) | 54 (30%) | 40 (28%) | |
| Primarily medicinal (4) | 47 (26%) | 26 (18%) | |
| Exclusively medicinal (5) | 13 (7%) | 3 (2%) | |
| Cannabis use days (past 90 days) (range: 0–90) | 74.5 (22.6) | 59.0 (32.5) | -5.1 (325)*** |
| Problematic cannabis use (SDS) (range: 0–13) | 2.7 (2.4) | 3.0 (3.0) | 1.2 (323) |
| Number of “hits” per day | 30.0 (63.0) | 24.1 (74.8) | -0.8 (324) |
| Primary form of cannabis used | | | 20.6 (5)** |
| Buds/flowers | 152 (85%) | 136 (92%) | |
| Concentrates (e.g., wax, shatter, dab) | 18 (10%) | 3 (2%) | |
| Concentrates (e.g., oils) | 6 (3%) | 0 | |
| Edibles | 2 (1%) | 7 (5%) | |
| Drinks or sprays/drops | 0 | 0 | |
| Don’t know / refuse to answer | 1 (<1%) | 2 (1%) | |

Notes: Diff. = difference; SDS = Severity of Dependence Scale.

* $p < .05$; ** $p < .01$; *** $p < .001$.

pling was accomplished by focusing on recruitment locations where young adults congregate, including medical cannabis dispensaries, college campuses, streets, and parks, as well as online (Craigslist). Chain referral methods allowed enrolled participants to refer other young adult cannabis users for enrollment into the study. See Lankenau et al (2018) for additional details on study procedures.

Measures

Sociodemographic variables. Age, sex assigned at birth, Hispanic ethnicity, race, and primary racial group (for multiracial individuals) were assessed. See Table 1 for the final list of racial/ethnic categories created.

Medical cannabis patient status. Patient status was verified through visual inspection of a medical cannabis recommendation to confirm that it was current and valid at the time of the interview.

Medicinal and/or recreational cannabis use. Participants were asked to characterize their cannabis use in the past 90 days as “medicinal” or “recreational” on a five-point scale. In the instructions for this item, medicinal use was described as “using marijuana to treat or help cope with any physical ailments, such as pain or discomfort, or psychological conditions, such as feeling anxious or sad, insomnia, etc.” Rec-

reational use was described as “using marijuana to socialize with others, to increase creativity, or to make experiences more pleasurable, interesting, or exciting.” Response options ranged from 1 (*exclusively recreational [no medical uses]*) to 5 (*exclusively medicinal [no recreational uses]*) and can be seen in Table 1.

Egocentric network characteristics. Participants completed a portion of the survey that assessed their egocentric network characteristics with the assistance of an interviewer. The instructions asked about “two groups of people in your life to learn more about who you spend time with.” Participants were asked to list up to five people “who you could talk to about things that are very personal and private, or if a situation came up where you needed some advice.” Next, participants were asked to list up to five people who make up “the regular circle of marijuana users who you’ve used with in the past 3 months . . . up to five people who you’ve used marijuana with most regularly overall.” Then, next to each person on the list, participants were asked to mark “S” for social support members, “M” for marijuana user members, and “B” if the person provided both social support and regularly used marijuana with them.

Social support network size was calculated by summing the number of alters in the “S” and “B” groups above. Cannabis use network size was calculated by summing the num-

ber of alters in the “M” and “B” groups above. Participants proceeded to answer a series of questions about each alter, such as “How often do you think this person uses marijuana?” with responses on a 5-point scale ranging from 0 (*never or not in the past year*) to 4 (*every day*) (*Don’t know* was treated as missing). Descriptive norms were calculated by averaging the perceived frequency of cannabis use among the alters in each ego network. Participants were also asked, “What is this person’s attitude toward marijuana?” with responses on a 5-point scale ranging from 0 (*very negative*) to 4 (*very positive*) (*Don’t know* was treated as missing). Injunctive norms are the average perceived attitude toward cannabis among the alters in each ego network. For the purposes of describing participants’ ego networks, we include participants reports of each alter’s medical cannabis patient status (currently had a “medical marijuana rec card”), and the primary form of cannabis used with each alter (e.g., buds/flowers, concentrates, edibles, etc.).

Cannabis use. Questions regarding cannabis use were derived from the existing literature on cannabis practices among medical and nonmedical cannabis users (Chapakis & Webb, 2008; Gieringer, 2012; Sifaneck et al., 2003). Cannabis use frequency was assessed by asking, “How many days have you used marijuana in the past 90 days?” (0 to 90 days). In addition, daily use frequency (“How many hits [pull off of a pipe, joint, bong, etc.] PER DAY did you typically do in the past 90 days?”) and primary form of cannabis use (e.g., buds/flowers, concentrates, edibles) were assessed for descriptive purposes.

Problematic cannabis use. The Severity of Dependence Scale (SDS; Martin et al., 2006) was used to assess problematic cannabis use. The SDS includes five items that assess an individual’s concerns about their own drug use (i.e., “did you ever think your use of marijuana was out of control,” “did the prospect of missing a smoke make you very anxious or worried,” “did you wish you could stop,” “did you worry about your use of marijuana,” and “how difficult would you find it to stop or go without marijuana”). Therefore, the definition of problematic cannabis use in the present study is focused on participant-centered worries and concerns about one’s own use, rather than functional impairment (Annaheim et al., 2008; Blevins et al., 2018; Sznitman & Room, 2018). Response options range from 0 (*never or almost never*) to 3 (*always or nearly always*) and are summed ($M = 2.8$, $SD = 2.7$, range: 0–13, $\alpha = .73$).

Data analysis

Descriptive statistics for participant and ego network characteristics were calculated for medical cannabis patients and nonpatient users. To address Aim 1, bivariate correlations were first used to examine relationships between variables of interest, and regression models were used to examine the unique associations between egocentric network

variables and cannabis use frequency and problems (adjusting for birth sex, race, medical cannabis patient status, and medicinal/recreational orientation). Linear regression was used to model problematic cannabis use, and negative binomial regression was used to model cannabis use frequency, because this variable was negatively skewed (skewness = -1.07 , $p < .001$) and overdispersed ($\chi^2 = 2,947.6$, $p < .001$; Long & Freese, 2014). To test the moderating role of patient status and medicinal and/or recreational orientation toward use in Aim 2, two-way interaction terms between each network variable and each moderator variable (patient status and cannabis use orientation) were added in separate regression models (with all continuous variables mean-centered). Any significant interactions were then included together in a final model. Plots were created to illustrate any significant interactions ($p < .05$) in the final model. For the medicinal/recreational orientation variable, simple slopes analysis was used to probe interactions at low (1 = *exclusively recreational, 1st–15th percentile*) and high (4 = *primarily medicinal, 72nd–95th percentile*) levels of participants’ orientation toward cannabis (Hayes, 2018, p. 249).

Results

As shown in Table 1, participants were 21 years old on average and predominantly male, with a higher proportion of men in the medical cannabis patient group. Hispanic/Latinx participants were the largest racial/ethnic group, but there were no significant group differences in race/ethnicity. The average score on the medicinal/recreational orientation measure was significantly higher for medical cannabis patients ($M = 3.0$, $SD = 1.1$) than nonpatient users ($M = 2.5$, $SD = 1.1$), signifying more medicinal use endorsed by patients. Cannabis use days were also higher among medical cannabis patients than nonpatients, but no between-group differences were found for problematic use or number of hits per day. Patients also differed in the primary form of cannabis used: more patients (10%) versus nonpatients (2%) primarily used concentrates, and more nonpatients (92%) primarily used buds/flowers and edibles, compared with patients (85%). Egocentric network characteristics are displayed in Table 2. Overall, participants named an average of eight alters in total and about six alters in their cannabis use network and social support networks; almost half of alters (43%–44%) were named in both networks. Patients endorsed greater descriptive norms and injunctive norms and named more medical cannabis patients as alters than nonpatients. Patients (24%) were also more likely to use concentrates with their alters compared with nonpatients (11%).

As shown in Table 3, multiple statistically significant bivariate correlations were found. Medical cannabis patients and participants with a greater medicinal use orientation tended to report more cannabis use days. Cannabis use network size, descriptive norms, and injunctive norms were also

TABLE 2. Egocentric network (alter) characteristics

| Variable | Medical cannabis patients (<i>n</i> = 182) | Nonpatient users (<i>n</i> = 157) | Group diff. χ^2 (<i>df</i>) or <i>t</i> (<i>df</i>) |
|---|--|---|---|
| | <i>M</i> (<i>SD</i>) or <i>n</i> (%) | <i>M</i> (<i>SD</i>) or <i>n</i> (%) | |
| Total network size | 8.5 (2.1) | 8.2 (2.1) | -1.3 (336) |
| Social support network size | 6.0 (2.2) | 6.2 (2.0) | 0.9 (337) |
| Cannabis use network size | 6.1 (2.6) | 5.6 (2.5) | -1.8 (337) |
| % overlap in both networks | 43% (28%) | 44% (28%) | 0.3 (335) |
| Descriptive norms (perceived frequency of cannabis use) | 2.7 (0.7) | 2.5 (0.8) | -2.8 (335)** |
| Injunctive norms (perceived attitudes toward cannabis) | 3.1 (0.6) | 2.9 (0.6) | -3.0 (335)** |
| Number of medical cannabis patients | 3.1 (2.3) | 2.2 (1.8) | -3.8 (337)*** |
| Primary form of cannabis use with alters (Number of egos who used _____ with 1 or more alters) | | | |
| Buds/flowers | 175 (95%) | 148 (94%) | 0.7 (1) |
| Concentrates (e.g., wax, shatter, dab) | 43 (24%) | 17 (11%) | 9.5 (1)** |
| Concentrates (e.g., oils) | 4 (2%) | 2 (1%) | 0.4 (1) |
| Edibles | 4 (2%) | 6 (4%) | 0.8 (1) |
| Drops/sprays | 0 | 0 | |
| Other | 6 (3%) | 5 (3%) | 0.003 (1) |

p* < .01; *p* < 0.001.

positively associated with cannabis use days. Furthermore, descriptive and injunctive norms had small but positive associations with problematic cannabis use.

Including these variables together in regression models (Table 4), descriptive norms were the only network variable significantly associated with cannabis use frequency in the past 90 days (adjusted incidence rate ratio [aIRR] = 1.19, 95% CI [1.06, 1.33]). In addition, medical cannabis patient status (aIRR = 1.19, 95% CI [1.05, 1.35]) and greater medicinal use orientation (aIRR = 1.10, 95% CI [1.03, 1.16]) were associated with more cannabis use days. In the regression model for problematic cannabis use, only African American race (relative to non-Hispanic White) was a significant predictor (*b* = 1.50, *p* < .001).

Moderation analyses revealed three significant interactions. First, medical cannabis patient status significantly interacted with descriptive norms (aIRR = 0.71, 95% CI [0.60, 0.85]). Descriptive norms were positively related to cannabis use days for nonpatient users (aIRR = 1.40, 95% CI [1.13, 1.72]), but this relationship was nonsignificant for medical cannabis patients (aIRR = 1.10, 95% CI [0.98, 1.23]). Second, medicinal/recreational use significantly interacted with descriptive norms (aIRR = 0.89, 95% CI [0.82, 0.96]). Descriptive norms were positively related to cannabis use days for participants who endorsed “exclusively recreational” use (aIRR = 1.52, 95% CI [1.25, 1.85]), but nonsignificant for participants who endorsed “primarily medicinal” use (aIRR = 1.07, 95% CI [0.94, 1.22]). Third, medical cannabis patient status significantly interacted with cannabis use network size (aIRR = 0.91, 95% CI [0.86, 0.96]). Cannabis use network size was positively associated with cannabis use

days among nonpatient users (aIRR = 1.10, 95% CI [1.02, 1.16]); this relationship was nonsignificant for medical cannabis patients (aIRR = 0.99, 95% CI [0.96, 1.03]). Including all three interactions in a single model revealed that only the interaction between medicinal/recreational use orientation and descriptive norms remained significant (aIRR = 0.91, 95% CI [0.84, 0.98]). Simple slopes of this final model show that descriptive norms were positively related to cannabis use frequency for “primarily medicinal” users (aIRR = 1.22, 95% CI [1.02, 1.46]), but this relationship was stronger for “exclusively recreational” users (aIRR = 1.62, 95% CI [1.31, 2.01]). A plot of this interaction (controlling for covariates and the other two significant interactions) is displayed in Figure 1.

In interaction models predicting problematic cannabis use, neither medical patient status nor medicinal/recreational use orientation were significant moderators of associations between network variables and this outcome (all *ps* > .05).

Discussion

Young adult medical cannabis patients and nonpatient users commonly endorse using cannabis for both medicinal and recreational reasons. However, it is unknown whether egocentric social network factors—such as the size of cannabis use and social support networks, or perceived cannabis use norms within young adult ego networks—have differential relations with cannabis use for young adult cannabis patients and nonpatient users. This is the first known study to examine whether such relationships differ between these two groups of young adults. Given variation in medicinal and

TABLE 3. Bivariate correlations

| Variable | 1. | 2. | 3. | 4. | 5. | 6. | 7. | 8. | 9. |
|---|------|------|------|-------|------|------|------|------|------|
| 1. Age | – | | | | | | | | |
| 2. Male (sex at birth) | -.02 | – | | | | | | | |
| 3. Medical cannabis patient | .09 | .13* | – | | | | | | |
| 4. Medicinal (vs. recreational use orientation) | .02 | -.10 | .22* | – | | | | | |
| 5. Social support network size | -.01 | .02 | -.05 | -.10 | – | | | | |
| 6. Cannabis use network size | -.10 | .05 | .10 | -.12* | .38* | – | | | |
| 7. Descriptive norms | -.05 | .01 | .15* | .01 | .09 | .61* | – | | |
| 8. Injunctive norms | .06 | -.02 | .16* | .06 | .11* | .49* | .61* | – | |
| 9. Cannabis use days (past 90 days) | .01 | .07 | .27* | .24* | -.05 | .25* | .40* | .33* | – |
| 10. Problematic cannabis use (SDS) | -.07 | .03 | -.07 | -.05 | .09 | .11* | .12* | -.01 | .16* |

Notes: SDS = Severity of Dependence Scale; correlation coefficients are expressed as phi coefficients ϕ (for two binary variables), point biserial correlations r_{pb} (for a binary and an ordinal variable), and Pearson’s correlation r (for two continuous variables). * $p < .05$.

TABLE 4. Results of multiple regression models ($N = 316$)

| Variable | Cannabis use days (past 90) | | Problematic cannabis use | | |
|--------------------------------|-----------------------------|---------------|--------------------------|-----------|----------|
| | IRR | [95% CI] | <i>b</i> | <i>SE</i> | <i>p</i> |
| Age | 1.00 | [0.98, 1.03] | -0.06 | 0.06 | .32 |
| Male (sex at birth) | 1.06 | [0.92, 1.21] | 0.19 | 0.32 | .56 |
| African American | 1.10 | [0.91, 1.32] | 1.50** | 0.45 | .001 |
| Asian / Pacific Islander | 0.86 | [0.62, 1.20] | 0.38 | 0.82 | .65 |
| Multiracial | 1.07 | [0.81, 1.41] | -0.88 | 0.68 | .19 |
| Hispanic Latino/x | 0.99 | [0.85, 1.15] | 0.62 | 0.37 | .10 |
| Medical cannabis patient | 1.19** | [1.05, 1.35] | -0.15 | 0.32 | .63 |
| Medicinal cannabis use motives | 1.10** | [1.03, 1.16] | -0.06 | 0.14 | .66 |
| Social support network size | 0.99 | [0.95, 1.02] | 0.10 | 0.08 | .18 |
| Cannabis use network size | 1.02 | [0.98, 1.06] | 0.03 | 0.09 | .76 |
| Descriptive norms | 1.19** | [1.06, 1.33] | 0.44 | 0.29 | .13 |
| Injunctive norms | 1.09 | [0.96, 1.25] | -0.51 | 0.34 | .13 |
| Intercept | 18.70*** | [9.25, 37.82] | 3.30* | 1.71 | .05 |

Notes: IRR = incidence rate ratio; CI = confidence interval; racial groups are in reference to non-Hispanic White. * $p < .05$; ** $p < .01$; *** $p < .001$.

recreational orientations toward cannabis among these two groups, we also examined medicinal/recreational orientation as a moderating variable.

We found mixed support for the hypotheses made in the first aim of our study. Although descriptive norms, injunctive norms, and cannabis use network size were positively related to young adults’ cannabis use days at the bivariate level, descriptive norms emerged as the only significant variable in multivariate regression models. This suggests that young adult cannabis users’ perceptions about how often their ego network members use cannabis are a stronger predictor of young adults’ own cannabis use than other network measures, such as the number of network members young adults use cannabis with (network size) or injunctive norms. This is consistent with existing studies of college students reporting that descriptive norms are a stronger correlate of cannabis use than injunctive norms (Buckner, 2013; Neighbors et al., 2008). However, it is inconsistent with recent research with young men who have sex with men showing that cannabis

use network size is a significant predictor of one’s own use (Janulis et al., 2019), perhaps because perceived descriptive norms were not accounted for in that study.

Contrary to our hypothesis, social support network size was not associated with cannabis use frequency or problematic use. Thus, the assumption that greater social support is associated with less substance use (see study by Janulis et al., 2019) may not always be true, at least in a sample of young adult cannabis users, many of whom reported medicinal use. This could also reflect relatively lower risk perceptions associated with cannabis use in recent years, particularly in California (Gali et al., 2021). Our finding could be illustrative of the tendency for young adult cannabis users to associate with like-minded, supportive individuals who generally do not try to dissuade them from using cannabis (social selection hypothesis). On the other hand, young adults may become more similar to their supportive network members over time (social influence hypothesis). Perhaps this explains why social support network size was not related

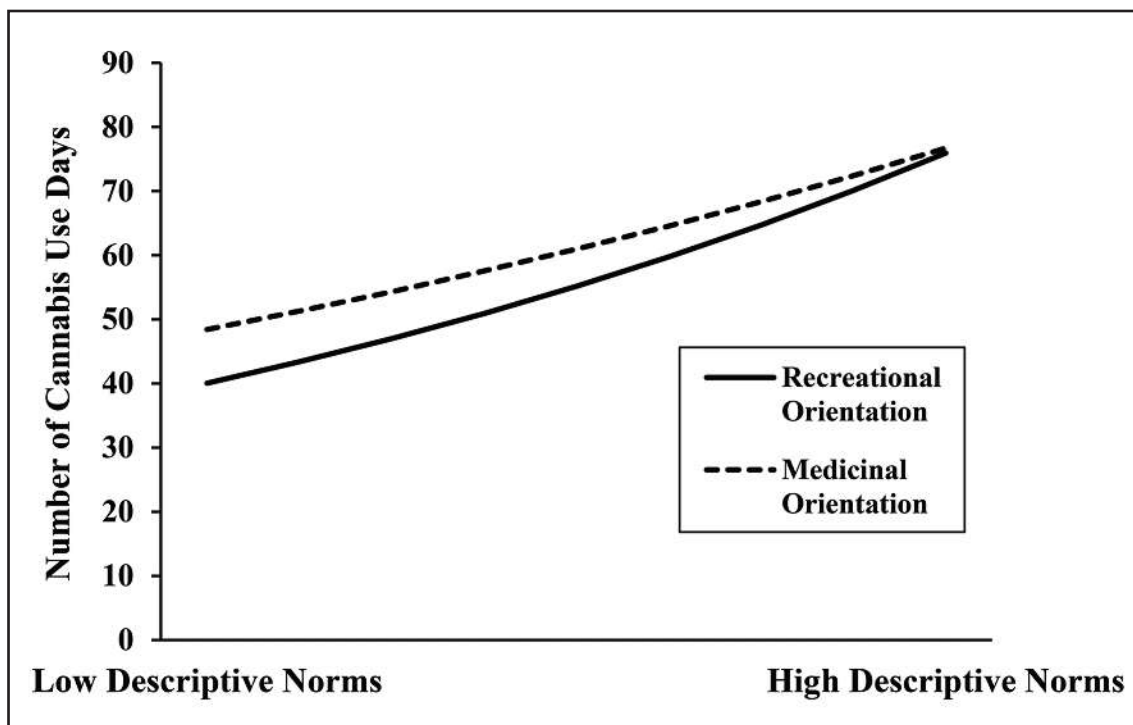


FIGURE 1. Medicinal/recreational cannabis use orientation moderates the relationship between descriptive norms and frequency of cannabis use. *Note:* Low descriptive norms corresponds to 1 *SD* below the mean (1.82); high descriptive norms corresponds to 1 *SD* above the mean (3.40).

to cannabis use or problems in the present study. However, more longitudinal research is needed to tease apart these two scenarios.

Contrary to our hypothesis, ego network variables were not related to problematic cannabis use. These results are contrary to early research by Neighbors et al. (2008), who found that both descriptive and injunctive norms were related to greater cannabis use consequences among first-year college students. Our results may be more similar to a study by Buckner (2013), who reported that only cannabis use frequency and coping motives were related to college students' cannabis use consequences. One may argue that coping motives are similar to self-reported medicinal use of cannabis because individuals are using cannabis to treat a mental or physical health condition. However, medicinal orientation toward cannabis was not associated with problematic use in the current study, a finding that runs contrary to other recent reports (Hummer et al., 2021; Tucker et al., 2019; Wardell et al., 2021). In fact, only Black/African American race (relative to non-Hispanic White race) emerged as a significant predictor of problematic use, calling for more research investigating racial/ethnic differences in perceived problematic use among medicinally oriented users.

Regarding our second study aim, results revealed that relationships between social network characteristics and cannabis use frequency may differ depending on young adults' medical cannabis patient status and medicinal and/or rec-

reational use orientation. As with our main effects models, descriptive norms emerged as a key network variable. Results support that descriptive norms for cannabis use within one's ego network are a stronger predictor of cannabis use frequency for young adults with a more recreational (vs. medicinal) orientation. Generally, this suggests that recreational users may be more strongly motivated to use via perceived cannabis use norms than medicinally oriented users. This is most likely because of differences in the functional role of cannabis for medicinal and recreational oriented users—that is, as medicine used to treat a variety of physical and psychological conditions (Hoffenberg et al., 2018; Lankenau et al., 2018; Patrick et al., 2016; Rotermann & Pagé, 2018; Smith et al., 2019). This contrasts with using cannabis to “have fun,” “experiment,” “think differently or creatively,” or for other recreational uses (Lankenau et al., 2018, p. 16).

It is interesting to note that although patient status significantly interacted with descriptive norms to predict cannabis use days, this interaction became nonsignificant after accounting for the interaction between recreational/medicinal orientation and descriptive norms. This suggests that the strength of the relationships between descriptive norms and cannabis use days largely varies as a function of one's self-reported orientation toward cannabis (recreational vs. medicinal), rather than if one is a medical cannabis patient or not. This is an example of how recreational/medicinal use orientation and patient status may not always align.

Importantly, neither medical patient status nor medicinal/recreational use orientation were significant moderators of associations between ego network variables and problematic use, suggesting that ego network variables are not associated with more or less problematic use among medicinal versus recreational oriented users.

Limitations

A number of study limitations should be acknowledged. First, the item used to measure medicinal and/or recreational cannabis use orientation was not derived from a validated scale; however, there is no uniform definition of medicinal cannabis use across studies of young adults or older adult users. Some studies define medicinal cannabis use as managing physical health conditions only (Hoffenberg et al., 2018; Wardell et al., 2021) or managing both physical and psychological health conditions (Roy-Byrne et al., 2015; Fedorova et al., 2019), whereas others leave medicinal cannabis use undefined and at the discretion of a survey respondent (Pacula et al., 2016; Rotermann & Page, 2018; Smith et al., 2019). Thus, measuring young adults' orientation toward cannabis on a spectrum ranging from medicinal to recreational may present a more nuanced operationalization of self-reported medicinal use than simply dichotomizing this construct (Budney, 2021; Rotermann & Pagé, 2018; Ryan-Ibarra et al., 2015; Wardell et al., 2021). Indeed, responses on this scale suggest that a majority of young adults in both groups endorse both medicinal and recreational uses of cannabis. Second, this study relies on self-report and cross-sectional data, precluding us from making assertions about temporal order. This precludes our ability to test competing hypotheses about social selection or social influence. Our self-report measure of cannabis use could have been improved by using a more detailed measure, such as a Timeline Followback (Norberg et al., 2012). Last, the sample is from Los Angeles and predominantly Latinx. Results may not generalize to other demographic groups or geographic areas, particularly with different medicinal or recreational cannabis use laws.

Conclusion and implications

The present study supports that, after taking into account other egocentric network variables, perceived descriptive norms are significantly associated with cannabis use frequency in a sample of medical cannabis patients and nonpatient cannabis-using young adults. Further, descriptive norms were more strongly associated with frequency of use for young adults endorsing a recreational (vs. medicinal) orientation toward cannabis. Given increasing medicinal cannabis use and efforts to legalize recreational use throughout the United States, future research, policy, and practice should take into account these findings. Interventions to reduce the frequency

of cannabis use may consider descriptive norms and cannabis use orientation as potentially modifiable factors. Our results suggest that interventions designed to modify young adults' perceived descriptive norms may have a stronger effect on reducing cannabis use for young adults who endorse more recreational, versus medicinal, cannabis use. More research is needed to determine how accurate these perceptions are, however, as correcting misperceptions is a key component of social norms interventions (Stockings et al., 2016). It is important to note that neither egocentric network measures, medicinal cannabis patient status, nor medicinal/recreational use orientation were associated with self-perceived problematic use. More research using other measures of problematic use (i.e., substance use disorder criteria according to the *Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition* [American Psychiatric Association, 2013]) may be needed to confirm this finding, which should be considered before implementing social network or broader policy interventions.

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