



Original article

## A Longitudinal Investigation of Associations Between Marijuana Displays on Facebook and Self-Reported Behaviors Among College Students

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 A B S T R A C T

**Purpose:** College students frequently display references to substance use, including marijuana, on social media such as Facebook. The significance of displayed marijuana references on social media is unknown. The purpose of this longitudinal cohort study was to evaluate college students' displayed marijuana references on Facebook and their association with self-reported marijuana use.

**Methods:** First-year students from two U.S. universities were randomly selected from registrar lists for recruitment. Data collection included 4 years of monthly Facebook coding, and yearly phone interviews that each assessed lifetime and current marijuana use. We compared frequencies of displayed marijuana references on Facebook between marijuana users and nonusers using two-sample *t*-tests and Pearson's chi-squared tests. Generalized linear models were used to evaluate the likelihood of displayed marijuana references on Facebook.

**Results:** A total of 338 participants were recruited, 56.1% were female, 74.8% were Caucasian, and 58.8% were from the Midwest college. Prevalence of displayed marijuana references on Facebook profiles varied from 5% to 10% across 4 years. Displayed marijuana references included most "Actions" and "Locations" on the Facebook profile. Marijuana users were more likely to display marijuana references on Facebook compared to nonusers, though Likes were more common among nonusers. Predictors of displayed marijuana references included lifetime and current marijuana use.

**Conclusions:** The prevalence of displayed marijuana references on Facebook was consistent but uncommon; marijuana references included both information sharing and personal experiences. Marijuana users were more likely to display marijuana references, suggesting these displays could be leveraged for intervention efforts.

**IMPLICATIONS AND CONTRIBUTION**

Previous studies have highlighted the presence of marijuana on social media; though the prevalence and meaning of individual college students' displayed marijuana references remains unclear. This longitudinal cohort study found low prevalence of displayed marijuana on Facebook over 4 years, and positive associations between Facebook display and self-reported behavior.

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 For the 66.2% of American youth that attend postsecondary education [1], college often represents a time of increased

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exposure to [2] and experimentation with marijuana [3]. Marijuana use increases after high school for youth who attend 4-year colleges compared to youth who do not [4]. The American College Health Association data reports that approximately one third of college students have tried marijuana [5] and it is second only to alcohol among substances most used by college students [6]. Marijuana use can take many trajectories over college, including early heavy use that may include daily smoking or intermittent use in social contexts [7,8].

While common, marijuana is associated with numerous adverse consequences including increased academic difficulties and greater psychiatric impairment [9–12]. Increased frequency of marijuana use has been found to be associated with risky sexual behavior and higher alcohol consumption [13]. The American Academy of Pediatrics policy statement regarding marijuana argued that given the evidence regarding negative health and brain developmental effects of marijuana in youth up to age 21 years, “the AAP is opposed to marijuana use in this population” [14]. Given the prevalence of marijuana use and associated negative health consequences, research to improve identification and intervention for college students to prevent these consequences is an important public health priority.

One potential innovative approach for understanding and identifying collegiate marijuana use is via social media. College students are avid users, with upward of 90% using one or more social media platforms [15]. Social media use can contribute to identity development and friendship formation during this critical developmental period [16]. Studies have suggested that marijuana content is commonly displayed on social media sites such as Twitter [17] and YouTube [18]. These previous studies have focused on describing marijuana displays on a particular social media platform, many of which are displayed by organizations promoting marijuana use or legalization. A current gap in the literature is understanding displayed marijuana references by individuals who choose to integrate marijuana content into their online identity. If displayed marijuana references on social media are associated with marijuana use, then opportunities may exist for peers, peer-leaders such as dormitory resident advisors [19], or other adult role models to provide timely and targeted screening, education or prevention messages. These messages may even be deliverable via social media. Thus, the purpose of this study was to evaluate college students’ displayed marijuana reference on Facebook.

This longitudinal cohort study followed Facebook profiles of college students for 4 years. Based on previous studies of displayed alcohol references and self-reported alcohol use [20], we hypothesized there would be a positive association between displayed marijuana references and self-reported use. We further tested this association across different frequencies of marijuana use. Our second hypothesis was that different Facebook actions or profile locations may vary in their association with self-reported marijuana use. Previous studies have found a stronger association between posts on certain locations and self-report for Facebook alcohol displays [21]. Thus, we evaluated the relationship between characteristics of displayed marijuana references on Facebook, including Location and Action on Facebook, and self-reported marijuana use.

## Methods

### *Study design and setting*

This longitudinal cohort study recruited incoming college students in 2011, data collection included Facebook evaluation and phone interviews yearly through 2015. The study included two state universities, one in the Northwest and one in the Midwest. Data for this study were collected between May 15, 2011 and September 23, 2015. This study received approval from the two relevant Institutional Review Boards.

### *Subjects*

Incoming students from the two study universities were recruited prior to starting college. We randomly selected potential participants from the registrar’s lists at both universities. Participants were eligible if they were between the ages of 17 and 19 years, English speaking, owned a Facebook profile and had enrolled as a full-time first-year student at a study-related university. Based on our previous studies of associations between social media display and self-report, our target recruitment was 300 participants.

### *Recruitment*

Recruitment involved several steps beginning with a preannouncement postcard. Over a 1-month recruitment period, potentially eligible students were recruited through emails, phone calls, and Facebook messages. Eligibility criteria were assessed and informed consent was completed by phone for all enrolled participants.

*Consent process and Facebook “friending”.* During the consent process potential participants were informed that this was a 4-year study involving yearly phone interviews and Facebook “friending” a research team profile. When two Facebook profiles are “friended,” profile content becomes mutually accessible. Participants were informed that their Facebook profile content would be viewed, but that no screenshots would be taken, and no content would be posted on the participant’s profile by the research team. Participants were asked to maintain open security settings with the research team’s Facebook profile.

*Facebook coding. Coder training to identify displayed Facebook marijuana references.* The coder training period began with a trainee reviewing an established coding manual [22] and observing trainers. Trainee coders then progressed to supervise preliminary coding. In this stage, trainee coders practiced with training datasets and coded data were reviewed and discussed with trainers. Once competency was achieved through evaluation of interrater agreement with trainers on practice datasets, coders began assessing study data. Initial coder training lasted approximately 6–8 weeks. For ongoing training, weekly meetings of all coders provided opportunities to review key coding rules and discuss difficult or unique cases.

*Coding variables.* Our primary coding variable was a displayed marijuana reference. Our standard approach was used to evaluate whether a displayed Facebook reference met criteria as representing marijuana, described in previous publications and studies [22–24]. A displayed marijuana reference was defined applying the Theory of Reasoned Action framework, which supports the importance of attitudes and intentions in predicting behaviors [25–27]. Accordingly, posts on Facebook that addressed attitudes, intentions or behaviors regarding marijuana were considered marijuana references, though coders did not categorize references as attitudes, intentions or behaviors during the coding process. Coders were trained to include alternative and slang terms for marijuana including weed, pot and cannabis, and resources to evaluate new or emergent terms for relevance. Example marijuana references included personal photographs in which the profile owner was smoking a substance labeled as “pot” in the picture caption, text references describing intending to consume weed at

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