



## Young adults who smoke cigarettes and marijuana: Analysis of thoughts and behaviors



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### HIGHLIGHTS

- An anonymous online survey assessed cigarette and marijuana use among young adults.
- Young adult cigarette smokers living in the U.S. were recruited and surveyed online.
- Use, dependence, temptations, decisional balance, and quit attempts were associated.
- Motivation and thoughts about abstinence differed.
- Findings inform treatment and prevention efforts for young people.

### ARTICLE INFO

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### ABSTRACT

**Introduction:** Smoking both cigarettes and marijuana is increasingly common among young adults, yet little is known about use patterns, motivations, or thoughts about abstinence. In a U.S. sample, this study explored young adults' severity of cigarette and marijuana co-use, quit attempts, and thoughts about use.

**Methods:** Young adults age 18-to-25 who had smoked at least one cigarette in the past 30 days completed an anonymous online survey.

**Results:** Of 1987 completed surveys, 972 participants reported both past-month cigarette and marijuana use (68% male, 71% Caucasian, mean age 20.4 years [ $SD = 2.0$ ]). Frequency of use, temptations to use, measures of dependence, decisional balance, and past-year quit attempts were associated across the two substances (all  $p < .05$ ), but not motivation to quit. Relative to marijuana, participants reported greater desire and a later stage of change for quitting cigarettes and were more likely to endorse a cigarette abstinence goal, yet they had lower expectancy of success with quitting cigarettes and with staying quit (all  $p < .001$ ).

**Conclusions:** Cigarette and marijuana use, temptations to use, and pros/cons of using were related in this young adult sample. Differences in motivation and thoughts about abstinence, however, suggest that young adults may be more receptive to interventions for tobacco than marijuana use. Use patterns and cognitions for both substances should be considered in prevention and intervention efforts.

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## 1. Introduction

### 1.1. Tobacco and marijuana co-use

Among young adults in the United States, cigarette smoking and marijuana use are strongly associated. In 2011, 36% of U.S. cigarette smokers aged 18–25 had used marijuana in the past month, almost three times the rate of the general adult population (Substance Abuse and Mental Health Services Administration, 2012a). A systematic

review of studies of cigarette and marijuana co-use in adolescence and young adulthood found consistently (85%) significant associations (Ramo, Liu, & Prochaska, 2012b). Cigarette smoking is associated with initiation (Agrawal, Lynskey, Bucholz, Madden, & Heath, 2007; Lai, Lai, Page, & McCoy, 2000) and extent (Kapusta et al., 2007; Leatherdale, Hammond, Kaiserman, & Ahmed, 2007; Peters, Budney, & Carroll, 2012) of marijuana use in young adulthood. There is also a reverse relationship, whereby those who use marijuana in early young adulthood are more likely to initiate cigarette use and have a greater likelihood of developing nicotine dependence than their non-marijuana using peers (Ramo & Prochaska, 2012b). Combined smoking of cigarettes and marijuana in young adulthood has been associated with worse health outcomes (e.g., poor lung function) than smoking either substance alone (Taylor et al., 2002).

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There are multiple suggested mechanisms underlying the co-use of cigarettes and marijuana including both genetic and environmental factors (e.g., availability, route of administration; Agrawal, Budney, & Lynskey, 2012). Limited research has focused directly on cognitive factors sustaining co-use, but cigarette and marijuana co-use may be perpetuated in part by similar beliefs about the two substances or that one substance supports the use of another. For example, in a study of 233 college students who smoked both cigarettes and marijuana, 65% smoked both substances in the same hour; 31% smoked cigarettes to prolong and sustain the effects of marijuana; and 55% had friends who engaged in these behaviors, suggesting that use is related both behaviorally and socially (inhalation; Tullis, DuPont, Frost-Pineda, & Gold, 2003). Another explanation for perpetuation of co-use includes a phenomenon called “blunt chasing,” or the smoking of a cigarillo or cigar following a blunt (marijuana wrapped in a cigar shell), which reportedly increases the sense of euphoria from taking these drugs (Amos, Wiltshire, Bostock, Haw, & McNeill, 2004).

### 1.2. Patterns and thoughts about tobacco and marijuana co-use

As the two most commonly used addictive substances among young adults, there is a need to examine whether behaviors and thoughts related to cigarettes and marijuana are similar among those who use both substances. If use and constructs associated with reducing use relate similarly across substances, it would support interventions that target both drugs simultaneously. Motivation to quit smoking cigarettes and marijuana is generally low among young adults (Diemert, Bondy, Brown, & Manske, 2013; Ramo & Prochaska, 2012b), suggesting that the Transtheoretical Model of behavior change (TTM; Prochaska & DiClemente, 1983) may be particularly appropriate to understand the co-use of these substances. The TTM includes three interrelated constructs: stages of change, temptations to use, and decisional balance (pros and cons of using) that have been used to describe cigarette smoking and predict quitting (DiClemente et al., 1991; Gritz, Schacherer, Koehly, Nielsen, & Abemayor, 1999; Perz, DiClemente, & Carbonari, 1996; Prochaska et al., 1994; Stotts, DiClemente, Carbonari, & Mullen, 2000). Our development and earlier analysis (in the current sample) of a staging scale for marijuana use were found to relate to concurrent frequency of marijuana use, temptations to use, and cons of using marijuana, consistent with what has been found in the cigarette smoking literature (Ramo, Liu, & Prochaska, 2012a).

Among young people, relapse to cigarettes and marijuana use is also high among those who have made a quit attempt. For example, in a review of 52 studies, median rates of smoking relapse among adolescents aged 20 or young who made a cessation attempt were 34% after one week and 89% after 6 months (Bancej, O'Loughlin, Platt, Paradis, & Gervais, 2007). In a study of 385 marijuana users who had made a self-initiated quit attempt, 88% had relapsed within 5 years (Chauchard, Levin, Copersino, Heishman, & Gorelick, 2013). Constructs of thoughts about abstinence, including desire to quit, perceived success at quitting, difficulty with staying quit, and abstinence goals, as originally described in Marlatt's Relapse Prevention model (Marlatt & Gordon, 1985), are also predictive of cigarette and other substance use outcomes (Hall, Havassy, & Wasserman, 1990/1991) and related to TTM constructs (Prochaska et al., 2004). Applied to marijuana, the thoughts about abstinence items assessing desire to quit, perceived success, anticipated difficulty, and abstinence goal correlated significantly with frequency of marijuana use and stage of change (Ramo, Liu, & Prochaska, 2012a).

Young people may think differently about their cigarette smoking and marijuana use. For example, the 2011 National Survey of Drug Use and Health showed that, 66% of youth age 12 to 17 perceived “great harm” from smoking one or more packs of cigarettes per day, compared to 45% for smoking marijuana once or twice a week (although frequencies of use differed for the cigarette and marijuana items; Substance Abuse and Mental Health Services Administration, 2012b). In a qualitative study of 99 adolescents who smoked cigarettes and marijuana, while most desired

to quit smoking cigarettes at some point in the future, few intended to stop using marijuana (Amos et al., 2004). Conversely, among youth surveyed in an addiction treatment program, intention to quit smoking cigarettes was lower than intention to quit using drugs (Ramo, Prochaska, & Myers, 2010). A study of more representative samples is needed to explore cigarette and marijuana co-use patterns and cognitions.

### 1.3. Present study

In a national, anonymous, cross-sectional survey of young adults who smoke cigarettes and use marijuana, the current investigation examined the relationship between: severity of use and quit attempts (Aim 1), thoughts about abstinence (Aim 2), and TTM constructs of stage of change, temptations, and decisional balance (Aim 3). For Aim 1, we hypothesized that greater cigarette use would be associated with greater marijuana use. We also explored the association between past year quit attempts for the two substances without an explicit hypothesis. For Aim 2, given perceptions that cigarette smoking is more harmful and less socially acceptable than marijuana use among young people, we hypothesized that young adults would have a stronger desire to quit and be more likely to have a goal of abstinence for cigarettes than marijuana. Further, given that cigarette smoking is legal federally and in more states, more readily available, and publicly used than marijuana, we expected that co-users would have lower efficacy for quitting cigarette smoking and staying quit from cigarettes than marijuana. For Aim 3, we hypothesized that the stage distributions would differ for cigarettes and marijuana with more young adults in preparation for quitting smoking than in quitting marijuana. Given strong associations between cigarette smoking and marijuana use (Agrawal et al., 2012; Ramo, Liu, & Prochaska, 2012b), we anticipated temptations to use and that the pros and cons of using (decisional balance) would be associated across the two substances. Given that temptations and decisional balance are known to vary by stage of change (DiClemente et al., 1991; Prochaska et al., 1994), we included stage of change for both cigarettes and marijuana as covariates in the examination of Aim 3 hypotheses. Understanding young adults' co-use and their thoughts about use of cigarettes and marijuana will help inform whether interventions should be targeted similarly, and possibly even simultaneously, for the two substances.

## 2. Methods

### 2.1. Participants and procedure

Data for the present study were taken from a U.S.-based internet survey of English-literate young adult cigarette smokers aged 18 to 25. Characteristics of the full sample and the three recruitment methods utilized (Facebook ads, Craigslist postings, survey sampling company) have been described previously (Ramo & Prochaska, 2012a; Ramo, Hall, & Prochaska, 2010). Advertisements that targeted young adult cigarette smokers or cigarette and marijuana users contained a hyperlink that directed potential participants to a separate website that included: 1) the study's IRB-approved consent form with verification questions to determine understanding of the consent process; and 2) a screener for determining eligibility including English literacy. The survey assessed demographic characteristics and then cigarette and marijuana use and thoughts about use as well as alcohol use for inclusion as a covariate. Participants were required to answer all questions before they could continue to the next page of the survey, but could quit the survey at any time. Computer IP addresses were tracked with one entry allowed from a single computer to prevent duplicate entries from the same person; however, multiple entries were allowed from the same internet connection (e.g., dormitories, apartment buildings).

Over 7567 people accessed the online survey, 7260 signed online consent, and 4242 met criteria to participate (age 18 to 25, smoked at least 1 cigarette in the past month). Eligibility checks excluded 494 respondents who had invalid data due to verifiably inaccurate responses, leaving 3748

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