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A prospective study of marijuana use change and cessation among adolescents

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ABSTRACT

Background: With marijuana use increasing among American adolescents, better understanding of the factors associated with decreasing use and quitting can help inform cessation efforts. This study evaluates a range of neighborhood, family, peer network, and individual factors as predictors of marijuana use, change, and non-use over one year, and cessation over six years.
Methods: Data come from adolescents in Waves I and II of the National Longitudinal Study of Adolescent Health ($N = 458$, one-year sample), or Waves I and III ($N = 358$, six-year sample), and reported using marijuana at least four times in the past month at Wave I.
Results: Eighteen percent of adolescents stopped using marijuana after six years. Results suggest neighborhood context affects overall use level, whereas neighborhood context and friends were critical to cessation vs. continuation of use. Decrease in use were more likely among adolescents in disadvantaged or less cohesive neighborhoods, or who moved between waves. Non-use after one year was more likely among adolescents who did not move, had fewer marijuana-using friends, and did not exclusively have outside-of-school friends. Cessation at six years was more likely among adolescents in less disadvantaged and more cohesive neighborhoods, and for those with within-school friends.
Conclusions: Results highlight the importance of both objective and subjective neighborhood characteristics, as well as peer networks, on adolescent marijuana use. Factors associated with decreases in use appear distinct from those that predict quitting, suggesting that continuation vs. cessation is linked to peers as well as neighborhood context. Relocated and isolated individuals may face challenges with cessation.

1. Introduction

Marijuana use is rising, with past year use reaching 36% among high school seniors (Johnston et al., 2014). Adolescent marijuana users tend to fare worse than abstainers in terms of academic achievement, earnings in young adulthood, involvement in delinquency, and engagement in sexual risk behavior (see Bryan et al., 2012; Ellickson et al., 2004; Lynskey and Hall, 2000; Tucker et al., 2006). However, there is evidence that adolescents who decrease their use show short-term gains in psychosocial maturity (Chassin et al., 2010) and have better behavioral outcomes in adulthood (Brook et al., 2011; Juon et al., 2011). Effective programs are needed to facilitate quitting among adolescents who have begun using marijuana. Better understanding of the barriers and facilitators of quitting can help inform these efforts.

Social disorganization theory (Shaw and McKay, 1942) emphasizes that adolescent delinquent behavior is not equally distributed across communities, but is clustered in more disadvantaged areas (e.g., Braveman et al., 2010; Haynie et al., 2006; Zimmerman and Messner, 2010). The theory posits that neighborhood features such as low socioeconomic status and residential instability influence individual behavior through their impact on neighborhood-level social processes, including exposure to deviant individuals and activities, environmentally induced stress, and fewer forms of social control or monitoring. However, there are only a handful of studies that consider the role of neighborhood disadvantage in adolescent substance use. The strength and direction of the relationship is unclear and varies by substance. For alcohol and tobacco, neighborhood disadvantage have been positively, negatively, and nonsignificantly linked to use. There is similar disagreement

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regarding marijuana initiation. Only two studies have considered the role of neighborhood characteristics in the quantity of marijuana use. Fagan et al. (2013) found no association in a sample of Chicago adolescents. Snedker et al. (2009) found a negative association between neighborhood disadvantage and quantity of use in a sample of Seattle adolescents. No studies have examined disadvantage and adolescent marijuana cessation.

Significantly more is known about factors associated with marijuana initiation than change in level of use, let alone cessation. Research generally finds that family and peer factors are associated with marijuana initiation (e.g., Buu et al., 2009; de la Haye et al., 2013; Dishion and Loeber, 1985; Furr-Holden et al., 2011; Hoffman, 1995; Tucker et al., 2013) and levels of use (Juon et al., 2011; Snedker et al., 2009; Tucker et al., 2014; Washburn and Capaldi, 2014; Windle and Wiesner, 2004), but their roles in quantity change and cessation are less clear and may operate differently given that these processes involve a different population (i.e., current drug users). Further, other than peer use, factors that predict marijuana initiation are generally not significant predictors of level of use (Washburn and Capaldi, 2014), and it is important to not conflate initiation with level of use or cessation. Longitudinal studies of adult marijuana users find that cessation is associated with being female, older, married, employed, more highly educated, and less exposed to social contexts encouraging use (see Agosti and Levin, 2007; Aitken et al., 2000; Chen and Kandel, 1998; Hammer and Vaglum, 1990; Kandel and Raveis, 1989; Sussman and Dent, 2004; Yamaguchi and Kandel, 1985). These studies suggest that transitioning to conventional adult roles has a deterring effect on marijuana use. Only one study has identified predictors of cessation during adolescence (Sussman and Dent, 1999), finding it more likely among older individuals, males, and those with less peer approval for using drugs, more unfavorable attitudes about drug use, and less violent victimization. However, results are based on youth with functional or delinquency problems enrolled in special continuation high schools and may not be generalizable to adolescent marijuana users more generally.

The present study is the first to simultaneously examine the importance of neighborhood, family, peer, and individual factors as short-term (one year) and longer-term (six year) predictors of change in levels of use and stopping use in a large national sample. Informed by social disorganization theory, we hypothesized that adolescents would be less likely to reduce or quit marijuana use if they resided in neighborhoods that were more disadvantaged (based on census data) or perceived to be less safe and cohesive (based on adolescent perceptions). Although no previous study has examined the influence of neighborhood characteristics on marijuana cessation, several have looked at initiation. Studies using objective characteristics have generated mixed results: disadvantaged and deteriorating neighborhoods have been positively associated with alcohol and marijuana initiation and use (Furr-Holden et al., 2011; Smart et al., 1994; Tucker et al., 2013), negatively associated (Snedker et al., 2009), and unassociated (Allison et al., 1999; Fagan et al., 2013). Subjective neighborhood measures provide more consistent findings that accord with social disorganization theory; adolescents report greater initiation and substance use if they report feeling less safe in their neighborhoods (Burlew et al., 2009; Choi et al., 2006; Theall et al., 2009; Tucker et al., 2013). Because of these mixed findings, we examine both objective and subjective neighborhood characteristics as predictors of change and cessation in adolescent marijuana use.

Social disorganization theory suggests that disadvantaged neighborhood effects on substance use are partly attributable to lower parental control and greater exposure to deviant or substance using peers in these neighborhoods, as proximate determinants. Thus, we hypothesized that adolescents would be more likely to decrease or stop using marijuana if: (a) they reported greater parental control and closeness; and lived in households where more parents and grandparents were present; (b) they had less exposure to substance using or deviant peers; (c) they reported less involvement in other problem behaviors; and (d) they had less easy access to substances in the home.

2. Methods

2.1. Participants and data collection

Data come from Waves I–III of the National Longitudinal Study of Adolescent Health (Add Health), a nationally representative longitudinal study of U.S. adolescents in grades 7–12 in 1995. The sampling frame included all high schools in the U.S.A. Initially, participants from 145 schools were given a basic interview at school. Data from this in-school interview were then used to generate a baseline sample of 20,745 adolescents aged 12–19 to complete interviews at home in 1995 (Wave I), 1996 (Wave II), and between 2001 and 2002 (Wave III). Fourteen thousand seven hundred and thirty eight respondents were re-interviewed at Wave II (87.6% response rate among eligible Wave I respondents; adolescents in grade 12 at Wave I were not interviewed at Wave II by design). Fifteen thousand one hundred and seventy Wave I respondents were re-interviewed for Wave III (76% response rate). In addition, parents of respondents were interviewed at Wave I. See Harris et al. (2009) for more details on the study design and longitudinal data. Regression analyses are corrected for attrition and complex sample design effects using strata, cluster, and weight variables (Chantala and Tabor, 1999).

Adolescents were excluded from the one-year analyses if they: (a) had not completed the in-school interview, the Wave II interview, or did not have a parent interview or neighborhood information (excluding $n = 11{,}348$); (b) did not use marijuana at least four times in the 30 days preceding the Wave I interview (excluding $n = 2246$ non-users and 568 users [51% of users]); or (c) were missing information on marijuana use at Wave II ($n = 32$), or perceived safety, selected neighborhood, race/ethnicity, or availability of drugs or alcohol in the home at Wave I (excluding $n = 88$). These exclusions resulted in a final analytic sample of $N = 458$. Analogous exclusions were made for the six-year cessation analysis (final analytic sample $N = 358$). We focus on youth who used marijuana at least four times in the past month in order to reflect those that had been somewhat regularly using marijuana; it is important to keep in mind that the analyses thus reflect change and cessation among these users. Table 1 provides unweighted descriptive statistics for the study variables for the two analytic samples.

2.2. Key measures

Marijuana use: Adolescents were asked how many times they had used marijuana in the past 30 days and whether they had used marijuana since the last interview. The analytic sample consists of those who reported using marijuana four or more times in the past 30 days at Wave I, which roughly corresponds to weekly use and is the median number of times reported by Wave I users. The majority of excluded users reported a single use in the past month, and "change" or "non-use/cessation" for this low level of use may be less meaningful. *Change* at Wave II was calculated as (Wave II use minus Wave I use). *Non-Use* at Wave II was defined as no reported use of marijuana since the last interview (binary response item). *Cessation* at Wave III was defined as no reported marijuana use since Wave I. Information on substance use was obtained via computer-aided self-interview, shown to improve the validity of self-reported sensitive data among adolescents (Supple et al., 1999; Turner et al., 1998).

Residential neighborhood characteristics at Wave I: Objective characteristics were assessed using 1990 U.S. Census data: proportion with income below the poverty line; proportion of family households that are female-headed with children under age 18; unemployment rate; and proportion of individuals aged 5 or older who lived in a different household 5 years earlier (an indicator of residential instability). These characteristics were assessed at the level of block group, and were derived by Add Health. Each item is typical of neighborhood characteristics considered in related literature (e.g., Haynie et al., 2006; Nowlin and Colder, 2007; Snedker et al., 2009; Tucker et al., 2013). These characteristics were converted to a neighborhood disadvantage scale (range −1.15–4.5, $\alpha = 0.88$; higher value = greater disadvantage) using exploratory factor analysis through SAS PROC FACTOR (Pasta and Suhr, 2004). We also examined two dichotomous subjective neighborhood characteristics based on adolescent report: neighborhood cohesion ("People in this neighborhood look out for each other"); and perceived safety ("Do you usually feel safe in your neighborhood?"). Following Hayne et al. (2006), we addressed possible selection effects by controlling for the most important reason parents provided for living in their neighborhood (out of 10 options, this variable is dummy coded as 1 if due to better schools, to be near family/friends, or because of low neighborhood crime). Analyses also control for whether the family moved to a different block group during the follow-up period, reducing exposure to the neighborhood factors measured at Wave I.

2.2.1. Personal demographics. Gender, age, race/ethnicity, total household income, mother's education, whether the adolescent lived with both parents, and whether