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Adult Work Commitment, Financial Stability, and Social Environment as Related to Trajectories of Marijuana Use Beginning in Adolescence

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Abstract

The objective is to examine trajectories of marijuana use among African Americans and Puerto Ricans from late adolescence to adulthood, with attention paid towards work commitment, financial stability, drug use and violence. (N=816.) The chronic marijuana user trajectory group compared to the none or low, increasing, and/or moderate marijuana user trajectory group was associated with negative aspects of work commitment, financial stability, and the social environment. The chronic marijuana user group was similar to the increasing marijuana user group on work commitment and financial stability. Treating marijuana use in late adolescence may reduce difficulty in the assumption of adult roles. Since chronic marijuana users experienced the most adverse effects in each of the domains, they require more intense clinical intervention than moderate marijuana users.

Keywords

Longitudinal study; marijuana use trajectory; work commitment

INTRODUCTION

A growing body of research has linked moderate-to-chronic marijuana use with a number of adverse psychosocial outcomes during an adolescent's transition into adulthood. These outcomes include lower physical and psychological well-being (1, 2) less success at work (3, 4), and increased difficulty with partner and peer relationships (5, 6). The present research adds to the literature on adult psychosocial outcomes as related to prior marijuana use. This study examines the developmental trajectories of marijuana use from adolescence to adulthood as they relate to work commitment and financial independence when the participants are in their thirties in the context of an environment characterized by drug use and violence using a longitudinal data set comprised of urban African American and Puerto Rican youth.

A widely documented finding in the literature is the association of higher levels of marijuana use with lower educational attainment (7). Furthermore, several researchers (5, 6) found that high levels of marijuana use during adolescence predicted higher levels of unemployment and reduced income at age 25. Similarly, Green & Ensminger (4) reported

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that using marijuana 20 or more times by the age of 17 was negatively associated with employment status at age 32–33. Research carried out by Ringel *et al.* (3) concluded that marijuana use in late adolescence (i.e., age 18) had a negative impact on the individual's annual salary earnings at age 29. Khantzian & Albanese (8) also report that more frequent marijuana use may be associated with the user's lack of motivation to follow through on occupational goals, much in the same way that marijuana use has been found to have an adverse effect on the educational achievement of high school students who smoke marijuana (9).

We contribute to the preceding research on marijuana use and work outcomes by focusing on a broad array of variables including work commitment (e.g., work achievement), financial stability (e.g., financial problems) and the social environment. Furthermore, we add to the scant literature on the consequences of different patterns of adolescent marijuana use on later aspects of work commitment among urban African Americans and Puerto Ricans.

An individual's probability of using marijuana has previously been linked to aspects of the social environment such as peer group substance use behaviors (10–13). Windle & Wiesner (14), following a cohort of 1295 suburban public school students who were predominately white, found that marijuana smokers who were in the "high chronics," "increasers," and "experimental users" trajectory groups were more likely to have a higher concentration of friends who used marijuana and other illicit drugs in adulthood than did those who were in the "abstainers" group. One mechanism used to explain these findings can be attributed to the theoretical framework of "homophily," in which an individual tends to gravitate towards peers who share similar behaviors, beliefs, and attitudes (15, 16). Andrews *et al.* (16), following a group of late adolescents into early adulthood, reported that the substance use behavior of participants, including marijuana use, correlated with the substance use behaviors of peers. Likewise, Ennett et al. (12) found that lesser social distance from substance users made an individual more likely to be a substance user. Our study extends previous research that has linked earlier peer substance use and the individual's drug use to a later stage of development, namely, adulthood.

Another aspect of the social environment is the individual's experience of being victimized. Kilpatrick *et al.* (17), using a national sample of 3,006 females between the ages of 18 and 34, reported that respondents who used drugs at the outset of the study were twice as likely to be physically assaulted within the next two years as compared to those who reported no drug use. In contrast, Martino *et al.* (18) reported that marijuana use was not associated with female victimization, but only male victimization. As a possible mechanism for the outcome of violent victimization, Martino and colleagues suggest that substance users have a higher likelihood of putting themselves in risky and dangerous situations when attempting to purchase or sell illegal drugs. Brady *et al.* (19), studying a cohort of 302 urban Mexican American and European American adolescents, found that substance use (e.g., marijuana, cigarettes) at age 15 was a significant predictor of violent victimization at age 19. The present research should add further clarification to the association between marijuana use and violence directed toward the individual upon reaching adulthood.

Using earlier ages with this sample, we identified 4 trajectories of marijuana use, associated with diverse consequences (20). We hypothesize that: (1) marijuana users will be divided into at least four trajectory groups that represent (a) chronic users, (b) moderate users, (c) increasing users, and (d) non- or low-users. Based on the literature cited above about marijuana users, we also hypothesize that: (2) the chronic marijuana user trajectory group will be associated with a lesser likelihood of commitment to work and a greater likelihood of financial instability (i.e., low work achievement, incapacitated at work, and financial

dependence) when compared to any marijuana user trajectory group with a lower degree of marijuana use; (3) the chronic marijuana user trajectory group will be associated with greater adverse social environment outcomes including violence towards the subject, peer drug associations, and co-worker's illegal drug use, when compared to the non-using or low user trajectory group.

Methods

Participants

T5 questionnaires were completed by 816 participants (52% African Americans, 48% Puerto Ricans). Data on the participants were first collected in 1990 (time 1; T1, N=1,332) when the participants were students attending schools in the East Harlem area of New York City. At T1, the questionnaires were administered in classrooms under the supervision of the study research staff with no teachers present. The mean age of participants at T1 was 14.1 years (Standard Deviation (SD)=1.3 years; inter-quartile range from 13 to 15 years). At time 2 (T2; 1994 – 1996; N=1,190), the National Opinion Research Center located and interviewed the participants in person or by phone. The mean age of the participants at this wave was 19.2 years (SD=1.5 years; inter-quartile range from 18 to 20 years). At time 3 (T3; 2000 – 2001; N=662), the Survey Research Center of the University of Michigan collected the data. The mean age of the participants at T3 was 24.4 years (SD=1.3 years; inter-quartile range from 23 to 25 years). At Time 4 (T4) and Time 5 (T5), the data were collected by our research group. At T4 (2004 – 2006; N=838), the mean age was 29.2 years (SD=1.4 years; inter-quartile range from 28 to 30 years). At T5 (2007 – 2010; N=816), the average age of the participants was 32.3 years (SD= 1.3 years; inter-quartile range from 31 to 34 years).

The New York University School of Medicine's Institutional Review Board (IRB) approved the study for T4 and T5, and the IRBs of both the Mount Sinai School of Medicine and New York Medical College approved the study's procedures for data collections in the earlier waves. A Certificate of Confidentiality was obtained from the National Institute on Drug Abuse for T1-T4 and from the National Cancer Institute at T5. At T1 and T2, passive consent procedures were obtained from the parents of minors. At each time wave, we obtained informed assent or consent from all of the participants. Additional information regarding the study methodology is available from previous reports (21).

At T5, we attempted to follow-up all those who participated at T1. We compared the demographic variables for the 816 adults who participated at both T1 and T5 with the 516 who participated at T1 but not at T5. There were no significant differences between the T5 non-participants and the T5 participants in the proportion of African Americans and Puerto Ricans (χ^2 (1) = 0.01, p=0.9) and their parents' marital status at T1 (χ^2 (1) = 0.81, p=0.4). However, the percentage of males among T5 non-participants (57%) was significantly higher than the percentage of males who participated at T5 (40%) (χ^2 (1) = 36.2, p<.001).

Measures

Demographic variables—a) *Gender*: female (1), male (2) and b) self-reported e*thnicity*: African American (1), Puerto Rican (2).

Marijuana use (T1-T4)—The participants reported their use of marijuana at each wave between T1 and T4. Participants were asked "How often have you ever used marijuana?" at T1 and "How often have you used marijuana in the past 5 years?" at T2 through T4. The answer options ranged from never (0) to once a week or more (4).

Work commitment (T5)—a) *Employment* was a single item: Did you have a job, either part-time or full-time, at any time during the past year? The answer options were no (0) and yes (1). b) *Work achievement* was a 3-item scale (α=.61), with sample item "Did you receive good evaluations from your boss?" The answer options ranged from never (0) to often (3). c) *Incapacitated at work* was a 2-item scale (inter-item correlation=.47, $p<.001$), with sample item "How many times in the last 6 months were you 'high,' drunk or stoned while at school or work on alcohol?" The answer options ranged from none (0) to 31–40 times (5). d) *Skipped work* was a 2-item scale (inter-item correlation =.79, $p<.001$), with sample item "How often have you skipped work?" The answer options ranged from never (0) to often (3).

Financial stability (T5)—a) *Financial independence* was a 3-item scale (α=.68), with sample item "Have you been able to establish financial independence?" The answer options were no (0) or yes (1). b) *Financial problems* was a 6-item scale (α=.80), with sample item "Are you having difficulty paying for utility bills (phone/gas/electricity)?" The answer options ranged from not at all true (0) to very true (4).

Social environments (T5)—a) *Co-worker's illegal drug use* was a 2-item scale (inter-item correlation = .72, $p<.001$), with sample item "How many of your co-workers use illegal drugs?" The answer options ranged from none (0) to most (3). b) *Violence towards subject* was a 5-item scale (α=.69), with sample item "How often has someone held a weapon (gun, club or knife) to you?" The answer options ranged from never (0) to five or more times (4). c) *Peer drug associations* was a 3-item scale (α=.66), with sample item "How often have your friends asked you to take illegal drugs?" The answer options ranged from not at all (0) to very often (3).

We then defined indicator variables for work commitment and for environment. Each work commitment and environment indicator was assigned the value 1 if the participant's scale score was in the highest 16^{th} percentile and zero otherwise. The indicator variable for financial independence was assigned 1 if the participant answered yes to all three items and zero otherwise.

Analytic Procedure

We used Mplus to obtain the trajectories of marijuana use from T1 to T4. Marijuana use at each point in time was treated as a censored normal variable. We applied the full information maximum likelihood approach (FIML) for missing data (22). We used the optimal Bayesian Information Criterion (BIC) to estimate the number of trajectory groups. Each participant was assigned to the trajectory group with the largest Bayesian posterior probability (BPP). The observed trajectories for a group were the averages of marijuana use at each point in time when a participant was assigned to the group with the largest BPP (see Figure 1).

To examine the associations of membership in a trajectory group, we used logistic regression analyses (23) that had the indicators of work commitment, financial stability, and social environment as dependent variables and the BPP of membership in the trajectory groups as the independent variables and gender and ethnicity as control variables. The exclusion of the BPP of the chronic marijuana trajectory as an independent variable made that group the focus of the association analysis. That is, a significant logistic regression coefficient for the BPP of a trajectory group meant that there was a significant difference in the probability of the outcome variable for the group compared to the probability for the chronic marijuana group.

RESULTS

We compared the African Americans and Puerto Ricans on each of our dimensions of work commitment, financial stability, and the social environment. Based on the chi-squared test, there were no significant differences on these dimensions. In contrast to ethnicity, there were a number of gender differences on the dimensions of work commitment and the social environment. Males as compared with females were more likely to be unemployed ($\chi^2(1)=5.3$, $p<.05$), incapacitated at work ($\chi^2(1)=29.4$, $p<.001$), and have co-workers who use illegal drugs ($\chi^2(1)=47.8$, $p<.001$). Also, males, as compared to females, were more likely to be exposed to violence ($\chi^2(1)=16.6$, $p<.001$) and associated with peers who used drugs ($\chi^2(1)=30.7$, $p<.001$).

The mean and standard deviation (SD) scores of marijuana use at each point in time were 0.2 (0.6), 0.8 (1.4), 1.2 (1.5), and 0.9 (1.5) for T1–T4, respectively. We computed solutions for 2 through 5 trajectory groups. The BICs and entropy measures for each number of groups were: 2 (5849, 0.75), 3 (5717, 0.81), 4 (5653, 0.82), and 5 (5662, 0.75). We chose the 4 trajectory group model because it had the smallest BIC (See Figure 1). The mean BPP of the participants who were assigned to the groups ranged from 87% to 93%, which indicated a good classification.

As shown in Figure 1, we labeled the four marijuana user trajectory groups as follows. The none or low marijuana use trajectory group had an estimated prevalence of 64% and included participants who reported no use of marijuana at each wave. The increaser trajectory group included participants who reported no use of marijuana at age 14, using marijuana from more than a few times a year (i.e., on average 1.5 use) to less than monthly at age 19, at least monthly but less than several times a month (i.e., on average 2.5 use) at age 24 and age 29. This group had an estimated prevalence of 10%. The moderate marijuana user group included participants who reported no use of marijuana at age 14, but using marijuana a few times a year thereafter. This group had an estimated prevalence of 12%. The chronic marijuana user group included participants who reported no use of marijuana at age 14, using marijuana less than several times a month at age 19 (i.e., on average 2.5 use), about once a week or more at age 24, and around several times a month at age 29. This group had an estimated prevalence of 14%.

Table 1 contains the percentages in each trajectory group for the variables in the study.

Table 2 presents the adjusted odds ratios (AOR) of each marijuana user trajectory group compared to the chronic user trajectory group for each T5 indicator-work commitment, financial stability, and social environment.

Membership in the trajectory groups was significantly correlated with many of the work commitment and environment indicators. A higher BPP for the chronic marijuana user trajectory group was associated with a decreased likelihood of employment (AOR=0.37, $p<.01$) compared with the BPP of the none or low user group. A higher BPP for the chronic marijuana user trajectory was associated with an increased likelihood of being incapacitated at work (AOR=27.94, $p<.001$) compared with the BPP of the none or low user group. A higher BPP for the chronic marijuana user trajectory group was associated with a decreased likelihood of having financial independence (AOR=0.35, $p<.001$) and an increased likelihood of having financial problems (AOR=1.88, $p<.05$), compared with the BPP of the none or low user group. A higher BPP for the chronic marijuana user trajectory group was associated with an increased likelihood having co-workers who use illegal drugs (AOR=2.25, $p<.001$). A higher BPP for the chronic marijuana user trajectory group was associated with an increased likelihood of violent experiences from others compared with the BPP of the none or low user trajectory group (AOR=3.01, $p<.001$). For peer drug

association, a higher BPP of the chronic marijuana user trajectory group was associated with an increased likelihood of having peers who associated with drugs compared with the none or low user trajectory group (AOR=6.94, $p<.001$)

A higher BPP of the chronic marijuana user trajectory group was associated with an increased likelihood of having peers who used illegal drugs compared with the BPP of the increasing user trajectory group (AOR=2.78, $p<.05$).

A higher BPP for the chronic marijuana user trajectory group was associated with decreased likelihood of being employed (AOR=0.39, $p<.05$) compared with the BPP of the moderate user trajectory group. A higher BPP for the chronic marijuana user trajectory group was associated with an increased likelihood of being incapacitated at work compared with the BPP of the moderate user trajectory group (AOR=3.62, $p<.05$). A higher BPP for the chronic marijuana user trajectory group was associated with a decreased likelihood of financial independence compared with the BPP of the moderate user trajectory group (AOR=0.35, $p<.01$). A higher BPP of the chronic marijuana user trajectory group was associated with an increased likelihood of having peers who were associated with illegal drugs compared with the BPP of the moderate user trajectory group (AOR=4.04, $p<.001$).

DISCUSSION

The present investigation examined the trajectories of marijuana use as related to work commitment, financial stability, and aspects of the social environment. There were four trajectories of marijuana use apparent in this sample. Given the close fit of the data with both theoretical reasoning and the reports of study participants, it appeared that the four-trajectory group approach summarized the marijuana use experiences of these young people over an important period of the life-course. Our findings indicated that trajectories of marijuana use were significant predictors of later work commitment, financial stability, and the participant's report of the social environment (victimization and peer drug associations), after control on gender and ethnicity.

Individuals in the chronic marijuana user trajectory group compared to those in the none or low user trajectory group and the moderate marijuana user trajectory group were more likely to be unemployed, and incapacitated at work. These findings are consistent with results obtained with this sample at a younger developmental stage and with the conclusion that marijuana use may have a negative impact on work commitment (24).

There are several possible explanations that may account for the relationship of the trajectories of marijuana use with both unemployment and incapacitation at work. One possible mechanism intervening between the use of marijuana and incapacitation at work is psychosocial failure which includes such dimensions as educational failure and engagement in crime (25). Another mechanism intervening between marijuana use and incapacitation at work proposed by Ringel *et al.* (3) involves diminished cognitive functioning which limits one's ability to perform work-related tasks. Indeed, there is growing evidence that the continued and chronic use of marijuana may lead to changes in the structure and function of the brain which may interfere with the abilities needed for achievements at work (26). The findings regarding marijuana use and incapacitation at work in the present analysis extend earlier results based on the same sample at an earlier stage of development (24). The results take on added importance as the relationships found in this study were among individuals who were average age 14 and followed into the thirties. The chronic user group compared with the increaser group were similar in terms of impaired work commitment.

A member of the chronic user trajectory group was more likely to be financially dependent than a member of the none or low marijuana user trajectory group, or a member of the

moderate user trajectory group. Schulenberg *et al.* (27) reported that those in the chronic user trajectory group had the lowest proportion reporting financial independence. Fergusson & Horwood (28) maintain that this may be related to the fact that cannabis use increases the chances of adopting an unconventional lifestyle characterized by disengagement from social norms such as completing an education. Lesser education was associated with financial dependence. Indeed, Lynskey and Hall (29) reported that early cannabis use is related to leaving school early. The negative consequences of marijuana use may include difficulty in obtaining work, being financially dependent on others, and experiencing financial problems. Brook *et al.* (24) studying these participants at an earlier developmental stage have found that earlier marijuana use was associated with an increased likelihood of being fired from a job. The chronic marijuana user trajectory group did not differ with respect to the dimension of financial stability.

Chronic marijuana user trajectory group was associated with a greater likelihood that co-workers used drugs than the none or low user trajectory group. This suggests that an individual's drug use may have an effect on whom he/she chooses to affiliate with at work. Indeed, individuals may be drawn to other drug users at work because they share similar attitudes, beliefs, and values. Of course, another explanation is that the relationship between the individual's marijuana use and whom he/she chooses to affiliate with at work is reciprocal in nature.

In accordance with the peer selection framework, those individuals in the chronic marijuana user trajectory group were more likely to associate with peers who used drugs than those in the none or low user trajectory group, than those in the increasing user trajectory group, and those in the moderate user trajectory groups. Several investigators have noted that individuals who use marijuana are more likely to lead an unconventional life style and select friends who also use marijuana (11, 30). Members of the chronic marijuana user group are less likely to maintain strong cultural values among family members which might result in less commitment to work, financial instability, and a problematic social environment (31).

Those in the chronic marijuana user trajectory group were more likely to experience violence from others than those in the none or low marijuana user trajectory group. This is consistent with other studies (32, 33). Conceivably, marijuana use is associated with impairment of the individual's judgment and ability to recognize and comprehend cues suggestive of impending violence. Additionally, the chronic user may be more likely to deal with potentially violent groups in order to obtain marijuana (34). Finally, chronic marijuana users may live in neighborhoods where violence is more prevalent.

The results suggest that the potential effects of chronic marijuana use on adult work commitment should not be treated as inconsequential. The findings of this study need to be taken into account with regard to future policies related to medical marijuana use. (35).

Of significance is the fact that there were no statistically significant differences between the chronic user trajectory group and the increasing user trajectory group on the following dimensions: a) work commitment, b) financial stability, and c) aspects of the social environment including a co-worker's illegal drug use and violence towards the participant. Indeed, as shown in Figure 1, marijuana use at ages 14 and 29 were nearly equal for the increasing user trajectory group and the chronic marijuana user trajectory group. Consequently, treatment programs should be focused not only on the chronic marijuana user trajectory group, but on the increasing user trajectory group as well.

The present study has several limitations. Our data are based on self-reports rather than official records (e.g., medical records or police reports). However, studies have shown that self-report data yield reliable results (36). Another limitation is that our sample did not

represent the full range of ethnic diversity existing in the United States, but only included African American and Puerto Rican participants living in a particular geographical urban area. Thus, we are limited in our ability to generalize beyond the present sample. Nevertheless, our findings are consistent with the results of other investigators (24, 27).

Despite these limitations, the study has a number of strengths. First, unlike most research that focuses on only one or two points in time, we assessed marijuana use over a span of 15 years covering important developmental stages from age 14 to 29. Second, the prospective nature of the data enabled us to go beyond a cross-sectional analysis and to take into consideration the temporal sequencing of variables. Third, the present study is unique since this study examined marijuana use trajectories as related to important aspects simultaneously; namely, work commitment, financial stability and the social environment (e.g., peer drug use and victimization). Fourth, the results add to the literature by showing that those in the moderate use trajectory groups were intermediate between the chronic users and none/low use participants. Fifth, this is the first longitudinal study focused on African Americans and Puerto Ricans living in an urban area covering almost two decades.

The results have implications for public health and treatment. Given the long term associations of chronic marijuana use and increasing marijuana use in adolescence and functioning in several important areas of adulthood, chronic marijuana use should be treated as an important public health problem. As regards public health, efforts made to reduce the chronic use of marijuana may go a long way toward increasing work commitment and financial stability in the individual. From a clinical perspective, treating marijuana use in late adolescence may serve to reduce the likelihood of becoming a marijuana-using adult who has difficulty in functioning in the world of work and the social environment. Since individuals in the chronic and increasing marijuana user trajectory groups experienced the most adverse effects in each of the domains, interventions are indicated for chronic and increasing marijuana users, in order to decrease the likelihood of long-term morbidity. There were no ethnic differences in adult work commitment, financial stability, and the social environment. Nevertheless, it would be important to make sure that prevention and treatment programs are culturally relevant and linguistically appropriate. This may enhance the acceptability of interventions for African Americans and Puerto Ricans, resulting in an improvement of the interventions efficacy (37).

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REFERENCES

1. Ellickson PL, Martino SC, Collins RL. Marijuana use from adolescence to young adulthood: multiple developmental trajectories and their associated outcomes. Health Psychol. 2004; 23:299–307. [PubMed: 15099171]
2. Gruber SA, Sagar KA, Dahlgren MK, Racine M, Lukas SE. Age of onset of marijuana use and executive function [published online ahead of print November 21, 2011]. Psychol Addict Behav. 2011 http://psycnet.apa.org.ezproxy.med.nyu.edu/doi/10.1037/a0026269.
3. Ringel JS, Ellickson PL, Collins RL. The relationship between high school marijuana use and annual earnings among young adult males. Contemp Econ Policy. 2006; 24:52–63.
4. Green KM, Ensminger ME. Adult social behavioral effects of heavy adolescent marijuana use among African Americans. Dev Psychol. 2006; 42:1168–1178. [PubMed: 17087550]
5. Fergusson DM, Boden JM. Cannabis use and later life outcomes. Addiction. 2008; 103:969–976. [PubMed: 18482420]

6. Brook JS, Lee JY, Brown EN, Finch SJ, Brook DW. Developmental trajectories of marijuana use from adolescence to adulthood: personality and social role outcomes. Psychol Rep. 2011; 108:339–357. [PubMed: 21675549]
7. Chatterji P. Illicit drug use and educational attainment. Health Econ. 2006; 15:489–511. [PubMed: 16389630]
8. Khantzian, EJ.; Albanese, MJ. Understanding Addiction as Self Medication: Finding Hope Behind the Pain. New York: Rowman & Littlefield Publishers Inc; 2008.
9. Brook JS, Balka EB, Whiteman M. The risks for late adolescence of early adolescent marijuana use. Am J Public Health. 1999; 89:1549–1554. [PubMed: 10511838]
10. Hussong AM. Differentiating peer contexts and risk for adolescent substance use. J Youth Adolesc. 2002; 31:207–220.
11. Lambert SF, Brown TL, Phillips CM, Ialongo NS. The relationship between perceptions of neighborhood characteristics and substance use among urban African American adolescents. Am J Community Psychol. 2004; 35:205–218. [PubMed: 15663207]
12. Ennett ST, Bauman KE, Hussong A, Faris R, Foshee VA, Cai L, duRant RH. The peer context of adolescent substance use: findings from social network analysis. J Res Adolesc. 2006; 16:159–186.
13. Ellickson PL, Tucker JS, Klein DJ. Reducing early smokers' risk for future smoking and other problem behavior: insights from a five-year longitudinal study. J Adolesc Health. 2008; 43:394–400. [PubMed: 18809138]
14. Windle M, Wiesner M. Trajectories of marijuana use from adolescence to young adulthood: predictors and outcomes. Dev Psychopathol. 2004; 16:1007–1027. [PubMed: 15704825]
15. McPherson M, Smith-Lovin L, Cook JM. Birds of a feather: homophily in social networks. Annu Rev Sociol. 2001; 27:415–444.
16. Andrews JA, Tildesley E, Hops H, Li F. The influence of peers on young adult substance use. Health Psychol. 2002; 21:349–357. [PubMed: 12090677]
17. Kilpatrick DG, Acierno R, Resnick HS, Saunders BE, Best CL. A 2-year longitudinal analysis of the relationships between violent assault and substance use in women. J Consult Clin Psychol. 1997; 65:834–847. [PubMed: 9337502]
18. Martino SC, Collins RL, Ellickson PL. Substance use and vulnerability to sexual and physical aggression: a longitudinal study of young adults. Violence Vict. 2004; 19:521–540. [PubMed: 15844723]
19. Brady SS, Tschann JM, Pasch LA, Flores E, Ozer EJ. Violence involvement, substance use, and sexual activity among Mexican-American and European-American adolescents. J Adolesc Health. 2008; 43:286–295.
20. Brook JS, Lee JY, Brown EN, Finch SJ, Brook DW. Developmental trajectories of marijuana use from adolescence to adulthood: Personality and social role outcomes. Psychological Reports. 2011; 108:339–357. [PubMed: 21675549]
21. Brook JS, Lee JY, Finch SJ, Brown EN. The association of externalizing behavior and parent-child relationships: an intergenerational study. J Child Fam Stud. 2012; 21:418–427. [PubMed: 23667304]
22. Muthén, LK.; Muthén, BO. Mplus User's Guide. 4th ed. Los Angeles: Muthén & Muthén; 2007.
23. Cody, RP.; Smith, JK. Applied Statistics and the SAS Programming Language. 5th ed. Upper Saddle River, NJ: Prentice-Hall, Inc; 2005.
24. Brook JS, Adams RE, Balka EB, Johnson E. Early adolescent marijuana use: risks for the transition to young adulthood. Psychol Med. 2002; 32:79–91. [PubMed: 11883732]
25. Marmostein NR, Iacono WG. Explaining associations between cannabis use disorders in adolescence and later major depression: A test of the psychosocial failure model. Addict Behav. 2011; 36(7):773–776. [PubMed: 21411234]
26. Matochik JA, Eldreth DA, Cadet J-L, Bolla KI. Altered brain tissue composition in heavy marijuana-users. Drug Alcohol Depend. 2005; 77:23–30. [PubMed: 15607838]
27. Schulenberg JE, Merline AC, Johnston LD, O'Malley PM, Bachman JG, Laetz VB. Trajectories of marijuana use during the transition to adulthood: the big picture based on national panel data. J Drug Issues. 2005; 35(2):225–279.

28. Fergusson DM, Horwood LJ. Early onset cannabis use and psychosocial adjustment in young adults. Addiction. 1997; 92:279–296. [PubMed: 9219390]
29. Lynskey M, Hall W. The effects of adolescent cannabis use on educational attainment: a review. Addiction. 2000; 95(11):1621–1630. [PubMed: 11219366]
30. Wayne, WD. Biostatistics: A Foundation for Analysis in the Health Sciences. Hoboken, NJ: John Wiley & Sons; 2005.
31. Brook, JS.; Pahl, K.; Rubenstone, E. The epidemiology of addiction. 4th ed. Galanter, M.; Kleber, H., editors. Textbook of substance abuse treatment; 2008. p. 29-44.
32. Vermeiren R, Schwab-Stone M, Deboutte D, Leckman PE, Ruchkin V. Violence exposure and substance use in adolescents: findings from three countries. Pediatr. 2003; 113(3):535–540.
33. Morojele NK, Brook JS. Substance use and multiple victimization among adolescent in South Africa. Addict Behav. 2006; 31:1163–1176. [PubMed: 16253426]
34. Farrington DP, Ttofi MM, Coid JW. Development of adolescence-limited, late-onset, and persistent offenders from age 8 to age 48. Aggress Behav. 2009; 35:150–163. [PubMed: 19172660]
35. Salomonsen-Sautel S, Sakai JT, Thurstone C, Corley R, Hopfer C. Medical marijuana use among adolescents in substance abuse treatment. Journal of the American Academy of Child & Adolescent Psychiatry. 2012; 51(7):694–702. [PubMed: 22721592]
36. Mennes CE, Abdallah AB, Cottler LB. The reliability of self-reported cannabis abuse, dependence and withdrawal symptoms: A multisite study of differences between general population and treatment groups. Addict Behav. 2009; 34:223–226. [PubMed: 19004561]
37. Castro FG, Stein JA, Bentler PM. Ethnic pride, traditional family values, and acculturation in early cigarette and alcohol use among Latino adolescents. J of Prim Prev. 2009; 30:265–292. [PubMed: 19415497]

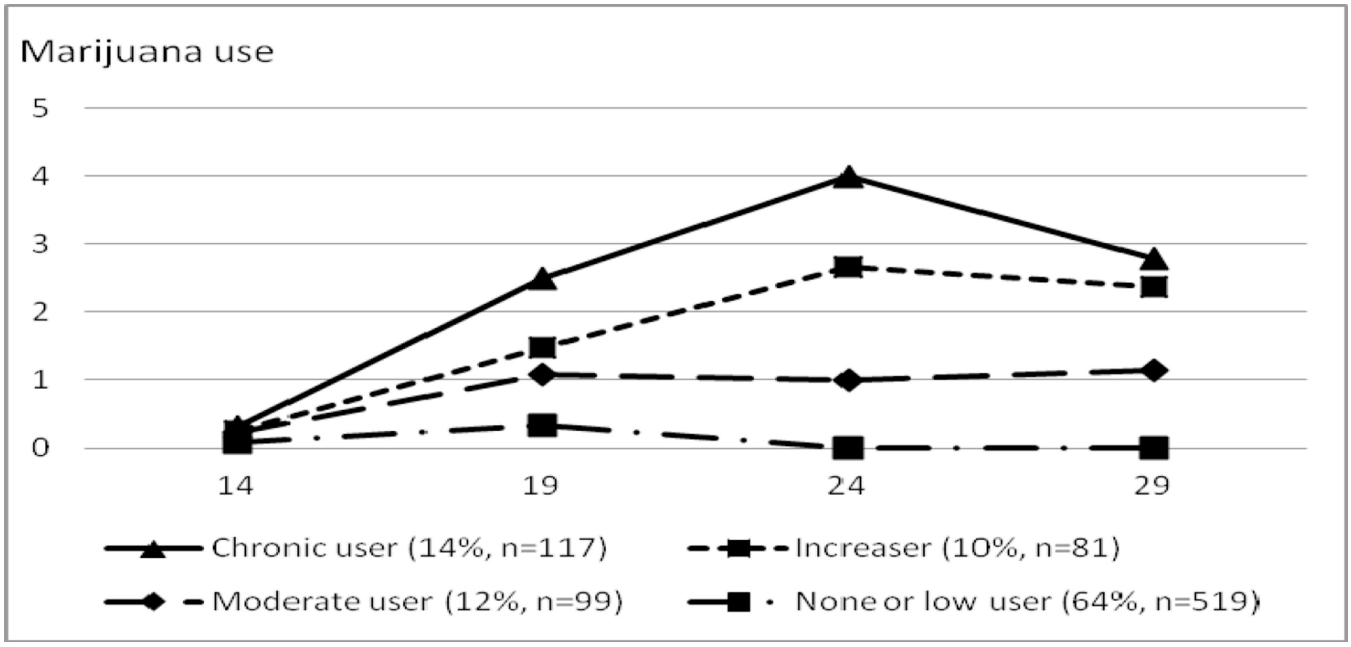

Fig. 1. Marijuana user trajectories (T1-T4)

Note. Answer options for marijuana use: never (0), a few times a year or less (1), about once a month (2), several times a month (3), once a week or more (4)

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Table 1

Percentages in variables by marijuana use trajectory group

		None or low users (64%, n=519)	Increasers (10%, n=81)	Moderate users (12%, n=99)	Chronic users (14%, n=117)
Demographic variables	African -American	53% (n=276)	54% (n=44)	48% (n=48)	49% (n=57)
	Females	68% (n=353)	48% (n=39)	57% (n=56)	38% (n=44)
Work commitment	Employment	89% (n=461)	79% (n=64)	90% (n=89)	80% (n=94)
	Work achievement	30% (n=152)	20% (n=16)	26% (n=26)	20% (n=23)
	Incapacitated at work	0.8% (n=4)	15% (n=12)	5% (n=5)	19% (n=22)
	Skipped work	16% (n=82)	20% (n=16)	23% (n=23)	13% (n=15)
Financial stability	Financial independence	58% (n=303)	46% (n=37)	57% (n=56)	36% (n=42)
	Financial problems	19% (n=97)	19% (n=15)	26% (n=26)	28% (n=33)
Social environment	Co-worker's illegal drug use	11% (n=58)	30% (n=24)	20% (n=20)	27% (n=22)
	Violence towards subject	8% (n=42)	15% (n=12)	12% (n=12)	23% (n=27)
	Peer drug association	6% (n=31)	14% (n=11)	11% (n=11)	32% (n=37)

Table 2

Adjusted odds ratios (AOR) and 95% Confidence Intervals (CI) of marijuana use trajectory groups to predict work commitment, financial stability, and social environment

T5		Marijuana use trajectory groups		
		Chronic vs. None or low users.	**Chronic vs. Increasers**	**Chronic vs. Moderate users**
Work commitment	Employment	0.37 ** (0.20, 0.68)	0.86 (0.39, 1.90)	0.39 * (0.17, 0.91)
	Work achievement	0.62 (0.36, 1.06)	1.22 (0.55, 2.68)	0.73 (0.37, 1.45)
	Incapacitated at work	27.94 *** (8.19, 95.33)	1.18 (0.50, 2.77)	3.62 * (1.23, 10.65)
	Skipped work	0.70 (0.35, 1.39)	0.35 (0.22, 1.26)	0.50 (0.22, 1.14)
Financial stability	Financial independence	0.35 *** (0.22, 0.56)	0.65 (0.34, 1.23)	0.35 *** (0.19, 0.64)
	Financial problem	1.88 * (1.11, 3.17)	1.75 (0.82, 3.73)	1.15 (0.60, 2.23)
Social environment	Co-worker's illegal drug use	2.25 ** (1.27, 3.98)	0.71 (0.35, 1.46)	1.21 (0.59, 2.19)
	Violence towards subject	3.01 *** (1.63, 5.55)	1.44 (0.64, 3.22)	1.99 (0.88, 4.48)
	Peer drug association	6.94 *** (3.78, 12.73)	2.78 * (1.25, 6.18)	4.04 *** (1.78, 9.18)

Notes 1

* $p < 0.05$;

** $p < 0.01$;

*** $p < 0.001$

2 Gender and ethnicity were statistically controlled.