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Divergent marijuana trajectories among men: Socioeconomic, relationship, and life satisfaction outcomes in the mid-30s

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Abstract

Background—Given recent changes in marijuana policy in the United States, it is important to understand the long-term effects of marijuana use on adult functioning. We examined whether men who displayed different trajectories of marijuana use from adolescence through emerging adulthood (age ~15–26) differed in terms of socioeconomic, social, and life satisfaction outcomes in their mid-30s.

Methods—Data came from a longitudinal sample of men who were recruited in early adolescence (N = 506) and followed into adulthood. Four trajectory groups based on patterns of marijuana use from adolescence into emerging adulthood were compared on adult outcomes (age ~36) before and after controlling for co-occurring use of other substances and several pre-existing confounding factors in early adolescence. The potential moderating effect of race was also examined.

Results—Although there were initially group differences across all domains, once pre-existing confounds and co-occurring other substance use were included in the model, groups only differed in terms of partner and friend marijuana use. Chronic marijuana users reported the highest proportions of both. Frequent and persistent marijuana use was associated with lower socioeconomic status (SES) for Black men only.

Conclusions—After statistically accounting for confounding variables, chronic marijuana users were not at a heightened risk for maladjustment in adulthood except for lower SES among Black men. Chronic users were more likely to have friends and partners who also used marijuana.

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Contributors

Dr. Rolf Loeber designed the Pittsburgh Youth Study (PYS) and Dr. Helene R. White and Dr. Dustin Pardini are co-Principal Investigators on the current grant studying long-term effects of marijuana use with the PYS data. Dr. Helene R. White conducted the literature search and wrote the first draft of the manuscript. Dr. Jordan Bech-told and Dr. Dustin Pardini conducted the data analysis. All authors contributed to and have approved the final manuscript.

Conflict of interest

The authors have no conflict of interest.

Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.drugalcdep.2015.08.031.

Future studies should take into account pre-existing differences when examining outcomes of marijuana use.

Keywords

Marijuana use; Adult roles; Long-term effects; Trajectories of marijuana use; Race differences

1. Introduction

Marijuana is the most widely used illicit drug in the United States (Johnston et al., 2013), and recent changes in marijuana laws in several states have led to increases in use among adolescents (Miech et al., 2015). Given the high and growing prevalence of users, it is critical to understand how chronic heavy use affects later life functioning and adult role attainment. Prospective studies examining the long-term effects of chronic marijuana use on adult functioning are relatively scarce and existing studies have methodological limitations (enumerated below). Expanding on prior research, this study uses longitudinal data from a sample of young men who were followed at least annually from adolescence through their mid-20s to examine the associations of varying trajectories of marijuana use with life functioning in adulthood (approximate age 36) in terms of socioeconomic, interpersonal relationship, and life satisfaction outcomes. Below we briefly review studies that have assessed these outcomes for varying patterns of marijuana use.

1.1. Socioeconomic outcomes

Many prior studies have found that trajectories of marijuana use are related to adult socioeconomic factors. There is fairly consistent evidence that frequent marijuana users tend to report fewer years of formal education than low or nonusers (Ellickson et al., 2004; Green and Ensminger, 2006; Lynne-Landsman et al., 2010; Patton et al., 2007; Tucker et al., 2005). Similarly, studies have found that abstainers report the highest earnings and heavier users report higher unemployment, higher welfare dependence, lower income, and lower work commitment (Brook et al., 2013; Ellickson et al., 2004; Fergusson and Bowden, 2008; Green and Ensminger, 2006). The group differences for socioeconomic outcomes have remained significant in the few studies that have attempted to control for some confounding factors that pre-date regular use (e.g., family socioeconomic background, family functioning, achievement, cognitive abilities; Fergusson and Bowden, 2008; Green and Ensminger, 2006) and co-occurring other substance use (Fergusson and Bowden, 2008).

1.2. Relationship outcomes

Although several studies have examined the influence of marijuana use on marital status, many assessed marital status at or before age 25 (e.g., Tucker et al., 2005; Patton et al., 2007), which may be too early given that the average age of marriage in the United States in 2008 was 27 for men and 26 for women (Cherlin, 2010). Studies that assessed marriage later in adulthood consistently have found that heavier marijuana use in adolescence and early adulthood is associated with lower rates of marriage (Brook et al., 1999; Green and Ensminger, 2006; Juon et al., 2011) and higher rates of having children out of wedlock (Brook et al., 1999; Green and Ensminger, 2006; Lynne-Landsman et al., 2010; Patton et al.,

2007). Nonetheless, few of these studies have controlled for factors that pre-date heavy marijuana use which may impact the formation of positive adult relationships (e.g., parent–child conflict).

In addition to marital status, it is important to examine relationship quality. Researchers typically have found that greater marijuana use during adolescence and emerging adulthood is associated with lower intimate partner relationship satisfaction, cohesion, and harmony, and more conflict (Brook et al., 2008, 2011; Fergusson and Bowden, 2008), even after controlling for potential confounding variables, such as adolescent interpersonal difficulties and parental relationships (Brook et al., 2008) and early family functioning and participant other drug use (Fergusson and Bowden, 2008).

It is also important to consider social relationships more broadly as studies have consistently found that drug users, compared to nonusers, are more likely to have drug-using friends (Pandina et al., 2009) and partners (Homish et al., 2007; Smith et al., 2014). There is a lack of longitudinal studies, however, that have specifically explored the association between early trajectories of marijuana use and later substance use by peers and partners. One exception is a study by Brook and colleagues, which found that chronic marijuana users had the greatest number of partners who used marijuana (Brook et al., 2011) and peers who used illicit drugs (Brook et al., 2013). In addition, we are aware of no longitudinal studies that have examined whether chronic marijuana use across adolescence may negatively impact the formation of a positive social support network more generally in later adulthood.

1.3. Life satisfaction outcomes

Only a few studies have examined the association between patterns of marijuana use and later life satisfaction. Fergusson and Bowden (2008) found that greater marijuana use was related to lower life satisfaction in emerging adulthood, even when controlling for confounding factors (e.g., childhood adjustment, mental health problems, other drug use). Ellickson et al. (2004) reported that abstainers had the highest levels of life satisfaction at age 29, compared to all marijuana trajectory classes, although the early high group did not differ from the other groups.

1.4. Limitations in prior research

There are several limitations in prior work that were addressed in the present analyses. First, many studies were only able to capture marijuana use in adolescence or only at a couple time-points. Second, most studies have not followed participants into the 30s, a developmental period when adult roles and intimate relation ships become increasingly solidified. Third, studies have not been able to comprehensively control for potential confounding factors that pre-date regular marijuana use, which makes it impossible to rule out the possibility that common causal factors account for the association between marijuana use and later adult functioning (Fergusson and Bowden, 2008). Fourth, many studies have failed to account for co-occurring other substance use. It is well known that marijuana users, compared to non-users, are more likely to use alcohol and other drugs (Jackson et al., 2008). Without controlling for other substance use, it is impossible to determine the unique effect of marijuana use on adult functioning.

Finally, only one study that we are aware of examined whether associations between regular marijuana use and adult functioning differ between racial groups. Braun et al. (2000) found that marijuana use was associated with occupational prestige for Whites but not for Blacks and with family income for White men, Black men, and White women but not Black women. However, Braun et al. examined marijuana use only during adulthood and did not examine early use. In addition, they did not account for confounding factors that pre-date regular marijuana use. Given racial differences in adult role attainment, such as lower income and education (Haynie and Payne, 2006), and later and lower rates of marriage (Piquero et al., 2002; Wilson, 1987) among Black, compared to White, individuals, it is important to understand whether the associations between marijuana use and adult functioning differ by race.

1.5. The present study

The purpose of this study was to examine the potential long-term associations between marijuana use and adult role attainment and life functioning among men. We examined whether patterns of marijuana use assessed annually from adolescence through emerging adulthood (approximate age 15–26) were associated with educational/economic achievement, relationship characteristics, and life satisfaction around age 36. Differences were examined before and after controlling for an extensive array of confounding factors that pre-date regular marijuana use and co-occurring other substance use. We expected that chronic marijuana users would report the worst outcomes and nonusers would report the best outcomes but that these group differences would largely be accounted for by early confounding factors and co-occurring other substance use. We also examined whether the association between chronic marijuana use and adult outcomes differed for Black, compared to White, men.

2. Material and methods

2.1. Design

Data came from the oldest cohort of the Pittsburgh Youth Study, a prospective longitudinal study of the development of delinquency, substance use, and mental health problems (Loeber et al., 2008). A random sample of boys enrolled in the 7th grade in Pittsburgh public schools in 1987–1988 was selected for screening; approximately 85% of the target sample ($N \approx 850$) agreed to participate. There were no significant differences between boys who were screened, compared to those who were not, in regard to achievement test scores, parental education, and race (Loeber et al., 2008). All boys who scored in the upper 30% on an index of conduct problems (based on their own, primary caretaker, and teacher reports) were selected for follow-up (hereafter referred to as “at-risk” youth). A random sample of an approximately equal number of boys from the remainder was also selected for the follow-up (total $N = 506$; 54.5% Black, 41.7% White, 3.8% other). At the first assessment following screening, the boys were approximately 14 years old ($M = 13.9$, $SD = 0.8$, range 12–16). They were interviewed every 6 months for 2.5 years and then annually for an additional 10 years until they were approximately 26 years old ($M = 26.0$, $SD = 0.8$, range 24–28). Participants were again re-interviewed when they averaged 36 years of age ($M = 35.8$, $SD = 0.8$, range 33–39). At the last assessment in 2009–2010, 85% ($N = 408$) of those still alive

(25 participants had died) were interviewed. Individuals who did and did not complete the age 36 assessment were similar in terms of family socioeconomic status, number of biological parents in the home, parent- and teacher-reported internalizing and externalizing problems, substance use, whether they were Black, and whether they were initially recruited from the at-risk end of the sampling distribution (see Supplemental Table 1). (See Loeber et al., 2008 for greater detail on the sample and design.)

All study procedures were approved by the University of Pittsburgh Institutional Review Board. Informed oral assent was obtained from participants through age 17, after which informed written consent was obtained. Informed written consent was obtained from legal guardians until participants became age 18.

2.2. Measures

2.2.1. Marijuana use—At the first six assessments, participants indicated the number of days in the past 6 months that they used marijuana. These biannual assessments were combined to create past year measures. During the subsequent 10 annual assessments participants reported on the number of days in the past year they used marijuana. This variable was recoded into an ordinal variable: 0 = no use (0 days), 1 = less than once per month (1–11 days), 2 = at least monthly but not weekly (12–51 days), 3 = 1–3 times per week (52–156 days), and 4 = more than 3 times per week (157–365 days). Past year marijuana use frequency was used to create marijuana trajectory groups (see Section 2.3).

2.2.2. Adult functioning outcomes—At the age 36 interview adult functioning was assessed with self-report data. Some measured variables were used to create latent constructs to enhance parsimony and eliminate measurement error (see Section 2.3). A detailed description of all measures and descriptive statistics are shown in Table 1.

Socioeconomic: a latent indicator of socioeconomic status (SES) was measured with three indicators – highest educational attainment, perceived job prestige based on the Hollingshead (1975) criteria, and income. A binary item indexed whether participants financially supported all biological children (1 = yes, 0 = no). (Men with no biological children were excluded from the analysis with this item.)

Relationship: a latent variable with three indicators, friend violence, theft, and drug dealing, was used to index friends' criminal behavior at age 36. Participants also reported the proportion of friends that used marijuana in the past year (1 = 50% or more; 0 = less than 50%).

Poor social support was a latent variable including five sub-scales from the Social Provisions Scale (Cutrona and Russell, 1987): attachment, social integration, reassurance of worth, reliable alliance, and guidance. Higher scores represented poorer social support.

At age 36 participants reported whether they currently had an intimate partner (1 = yes, 0 = no), whether they were currently married (1 = yes, 0 = no), and whether their partner had used marijuana at least once in the past year (1 = yes, 0 = no) (men without partners were excluded for from the analysis with this item). Those with partners at age 36 rated their

relationship quality with three subscales from the Revised Dyadic Adjustment Scale (Busby et al., 1995): dyadic consensus, satisfaction, and cohesion, which formed one latent measure of relationship quality (higher values represented poorer quality).

Participants reported whether they had any biological children (1 = yes, 0 = no), children from more than one woman (1 = yes, 0 = no), and biological children that they had not seen in the past month (1 = yes, 0 = no) (participants without biological children were excluded from the analysis for the last item).

Life satisfaction: life satisfaction was a latent variable based on three items asking participants to rate their overall life satisfaction, happiness, and overall quality of life. Higher scores indicated more overall satisfaction/happiness with life. These three scales have been extensively used and validated in prior studies (Veenhoven, 2015).

2.2.3. Control variables—Early adolescence confounding variables: The confounding variables were averaged across the first (mean age = 13.9) and second (mean age = 14.4) assessment after screening. Family socioeconomic status was calculated based on the Hollingshead (1975) index combining educational attainment and current occupation of the parent(s) in the home. Academic achievement was averaged across teacher, parent, and youth report of school performance on reading, writing, math, and spelling. Higher scores represented more academic problems. Peer deviance was assessed using the Peer Delinquency Scale (Loeber et al., 1998), which asked youth the proportion of their friends who engaged in 15 different deviant acts (including substance use) over the past year (α = .90). Depressed mood was assessed at only Time 1 with 13 items from the Child Self Report (short version) of the Recent Moods and Feelings questionnaire (α = .84; Angold et al., 1995). All items were summed; higher scores represented greater depressed mood. This control variable was used as a proxy for pre-existing levels of life satisfaction. The parent- and youth-reported Revised Parent-Adolescent Communication Form was used to measure conflict, cohesion, and openness in the parent–adolescent relationship (34 items; Loeber et al., 1998). Parent (α = .84) and youth (α = .88) reports were averaged to create one measure; higher scores represented worse communication.

Co-occurring tobacco, alcohol, and hard drug use (ages 15–26): Variables were created to represent tobacco and alcohol use in three unique developmental periods: adolescence (15–17 years old); early emerging adulthood (18–20); and later emerging adulthood (21–26). Tobacco use was the number of years within each period that the young man used tobacco daily. Using the same ordinal scale as marijuana, co-occurring alcohol use was the average of the ordinal alcohol variables across the years in each period. Because of low base rates, a binary variable was created to indicate whether participants reported using any hard drugs (e.g., cocaine, stimulants, hallucinogens) between ages 15 and 26.

Race: for all analyses, Black men (N = 275) were compared to White/other men (N = 229), hereafter referred to as White.

2.3. Analysis plan

When comparing trajectory groups on the study outcomes, weighting was used to adjust for the oversampling of at-risk youth at the initial study screening. This procedure assigns persons who are in the under-represented group a weight larger than 1 (non at-risk youth), and persons who are in the over-represented group a weight smaller than 1 (at-risk youth). The use of weighting makes the findings reported representative of the original screening sample (i.e., randomly selected 7th graders enrolled in the Pittsburgh public schools). Findings remained unchanged when data were rerun using unweighted data.

A previous study using Latent Class Growth Analysis (LCGA; Muthén, 2004) with the current sample identified four trajectory groups of marijuana users from approximate ages 15 through 26 (Pardini et al., 2015). Marijuana use was specified as an ordinal variable and models were run using maximum likelihood estimation with robust standard errors (MLR) with Mplus 7.2 (Muthén and Muthén, 1998). The specific groups and their weighted percentages in this sample were: low/non (51.0% in the present sample), adolescence-limited (8.9%), late increasing (20.3%), and chronic high (19.7%) users (see Fig. 1). These percentages reported vary slightly from those reported by Pardini and colleagues (2015) because weighting adjustment was used to account for the over-sampling of at-risk youth.

All average posterior probabilities were 0.8 or greater. Although one of the aims was to examine differences between groups of individuals who exhibited different patterns of regular marijuana use from adolescence into emerging adulthood, it is also important to contrast these groups with individuals who engaged in experimental use or reported no use. This provides an indication of whether regular marijuana users more generally defined (i.e., chronic high, late-onset, or adolescence-limited users) exhibit more psychosocial impairments relatively to individuals who did not engage in regular use across multiple waves.

A 3-step procedure in Mplus, which statistically adjusted for the uncertainty in group membership, was used to investigate whether trajectory groups differed on adult psychosocial outcomes (Asparouhov and Muthén, 2013). To eliminate measurement error and enhance parsimony, latent factors were specified to index socio-economic status, friends' criminal behavior, social support, partner relationship quality, and life satisfaction (for indicators see Table 1). Initial confirmatory factor analyses indicated that all latent factors showed good model fit (analysis available upon request). Analyses first examined group differences on the adult outcomes after controlling for race differences. A second set of models added early adolescence confounding variables and co-occurring substance use as covariates.

Models were run using full information maximum likelihood estimation (FIML), which accounts for missing data by estimating model parameters using all available information and provides unbiased estimates under the assumption that data are missing at random. The analytic sample for most models was 504 (two individuals had missing data on all marijuana use assessments and the outcomes). Models that were only relevant to participants with a biological child or participants with a current partner were limited to 403 and 402, respectively.

Final analyses examined race differences in the associations between trajectory group membership and adult outcomes. For these analyses, men were hard-classified into their most likely group. Interaction terms between race and marijuana groups were used to test for moderation by race.

3. Results

3.1. Trajectory group differences before controlling for covariates

Table 2 presents results comparing the four trajectory groups on adult outcomes with only race included as a covariate. Marijuana groups differed on SES, friends' criminal behavior, friend marijuana use, currently married, partner marijuana use, children by multiple partners, recent child visitation, and overall life satisfaction. The chronic group, compared to the low/nonuser group, reported significantly worse outcomes on all measures. The late increasing group, compared to the low/nonuser group, reported more friend and partner marijuana use and more friends' criminal behavior, and compared to the chronic group, reported higher SES and less partner marijuana use. The adolescence-limited group reported lower life satisfaction and more friends' criminal behavior than the low/nonusers and less partner and friend marijuana use than the chronic high group. None of the outcomes differed between the adolescence-limited and late increasing groups.

Race differences are also shown in Table 2. There were significant race differences for SES, financially supporting all children, friend's criminal behavior and marijuana use, current intimate partner and spouse, children by multiple women, recent child visitation, and life satisfaction. Black men reported worse outcomes than White men. In addition, Black men, compared to White men, were significantly more likely to have at least one biological child.

3.2. Trajectory group differences after controlling for covariates

When all controls were included in the model (Table 3), only friend and partner marijuana use remained significant. Specifically, the chronic group was significantly more likely than the adolescence-limited and low/nonuse group to report half or more friends using marijuana in the past year. There was no difference between the chronic and late increasing groups. The late increasing group also reported a higher proportion of friends who used marijuana than the low/nonuser group. The adolescence-limited group did not differ from low/nonuse or late increasing groups. Men in the chronic group were more likely to have a partner who used marijuana in the past year than men in the adolescence-limited and low/nonuser groups. The late-onset group did not differ from any of the three groups.

To examine whether our findings were impacted by the inclusion of a large number of non-significant covariates, a backward stepwise regression approach was used to identify a reduced set of covariates that each significantly predicted each outcome. When models were re-run using this reduced number of covariates, the results were unchanged (i.e., the only significant differences were for partner and peer marijuana use). We also examined whether the three marijuana-using groups combined were different than the low/non-user group and the only significant outcomes were any partner and peer marijuana use. These supplemental analyses are available upon request.

With controls in the model, the previous significant race differences remained except race was not associated with life satisfaction or friend marijuana use and borderline significantly lower SES than the late-onset group ($p < .051$).

In an exploratory analysis, we investigated whether at-risk status moderated associations between marijuana groups and each of the outcomes. None of the interactions were statistically significant ($ps > .05$).

3.3. Moderating effect of race

In the last stage of the analysis, we investigated whether the association between marijuana trajectory group and adult outcomes differed for Black vs. White men controlling for adolescent confounding variables and co-occurring substance use. There was one significant interaction for SES (not shown but available upon request). For White men, there were no marijuana group differences in SES, whereas for Black men, the chronic group reported significantly lower SES than the low/nonuse group ($p = .044$) and borderline significantly lower SES than late-onset group ($p = .051$). The adolescence-limited group did not differ from any group.

4. Discussion

4.1. Summary

This study used prospective longitudinal data to examine how different developmental patterns of marijuana use for men from adolescence through emerging adulthood were associated with life functioning assessed in the mid-30s. Although groups differed significantly on socioeconomic, relationship, and life satisfaction outcomes, all but two group differences (i.e., friend and partner marijuana use) were reduced to non-significance for both White and Black men and SES remained significant for Black men only after statistically adjusting for the confounding effects of early risk factors and co-occurring other substance use.

The significant finding for the marijuana trajectory group differences in the proportion of marijuana-using friends and partners is not particularly surprising given that previous analyses with this sample found that early chronic and late escalating users were more likely to continue using marijuana in their mid-30s relative to men in the adolescence-limited and low/nonuse groups (Pardini et al., 2015). The higher proportion of marijuana-using friends supports previous research indicating the importance of peer selection and socialization processes for substance use in adolescence and emerging adulthood (Pandina et al., 2009; White et al., 2008). This study extends those findings into adulthood (see also Brook et al., 2013), although the data in the present study are not able to disentangle the effects of these competing hypotheses. Similarly, it is unclear whether the higher partner marijuana use among chronic marijuana users results from “assortative mating” (i.e., marijuana users select mates who use) or a “contagion effect” (i.e., one partner's marijuana use influences the other's continued use) (see Fleming et al., 2010).

While the groups differed in terms of marijuana use by significant others, once controls were included in the model, they did not differ on any indicator of psychosocial functioning in

adulthood, except SES for Black men. With these same data, Bechtold and colleagues (2015) found no negative effects of chronic marijuana use on physical or mental health outcomes at age 36 and Pardini and colleagues (2015) found that, although chronic marijuana users, compared to low/nonusers, were more likely to commit drug-related crimes, they were not more likely to commit other types of crimes (i.e., theft and violence). Taken together, these findings suggest that the negative effects of chronic marijuana use on adult functioning may be largely drug-specific; that is, chronic use leads to greater involvement in marijuana-using subcultures and illegal drug markets (Schroeder et al., 2007).

Our results underscore the importance of controlling for pre-existing confounds and co-occurring substance use when examining outcomes associated with heavy marijuana use. Without controls, we found that marijuana trajectory groups differed in terms of SES, friends' criminal behavior, friend and partner marijuana use, being married, having children by multiple women, recent child visitation, and life satisfaction, with low/nonusers showing the most positive outcomes and, chronic users generally the worst. These findings are consistent with previous trajectory studies (e.g., Brook et al., 1999, 2008; Ellickson et al., 2004; Juon et al., 2011; Lynne-Landsman et al., 2010). Nevertheless, when control variables were included, most group differences became non-significant. One exception was that, even after controlling for model covariates, Black men in the chronic group reported lower SES than Black men in the low/non-user group. There were no SES differences among the marijuana groups for White men. This finding runs counter to a prior investigation, which indicated that marijuana use among adults may have a greater impact on occupational prestige among White relative to Black individuals (Braun et al., 2000), although others have reported employment difficul-ties among Black chronic marijuana users (Brook et al., 2013; Green and Ensminger, 2006). Overall, Black men tended to have worse occupational, social, and life satisfaction outcomes than White men, consistent with prior studies that have identified racial disparities in adult role attainment (Haynie and Payne, 2006; Piquero et al., 2002; Wilson, 1987).

4.2. Limitations

The results should be interpreted with caution due to several limitations. The marijuana trajectory groups were based on frequency of use and did not take into account quantity, quality, or potency of marijuana. The outcomes were based on self-reports and could not be confirmed by collaterals. Nevertheless, nearly all prior studies have also assessed marijuana use and outcomes with self-report data. The sample was obtained from one geographic area and analyses were limited to men. It will be important to replicate these findings with a nationally representative sample of men and women. It is also important to note that we may not have had enough statistical power to observe small effects when examining groups with small sample sizes. Finally, although race largely did not moderate the associations between marijuana use and the outcomes studied here, future research should continue to investigate how other individual differences might affect the association between marijuana use and adult dysfunction.

4.3. Conclusion

Given the potential increase in marijuana use in the United States, it is important to examine the long-term consequences of use. Overall, the data suggest that, after controlling for confounding factors that pre-date regular marijuana use and co-occurring other substance use, chronic marijuana use in adolescence and emerging adulthood had little effect on interpersonal relationships and life satisfaction in the mid-30s and affected socioeconomic attainment only for Black men. Given the importance of research on long-term effects of marijuana use for current policy decisions, future studies should investigate additional outcomes (e.g., Meier et al., 2012; Volkow et al., 2014) and other types of samples. As Ellickson et al. (2004) and others have suggested, previous findings indicating lower achievement among marijuana users, compared to nonusers, probably reflect the type of person who chooses to use marijuana early and chronically rather than the effects of marijuana use per se. Our results underscore the need for future studies to take into account pre-existing differences when examining outcomes of marijuana and other substance use.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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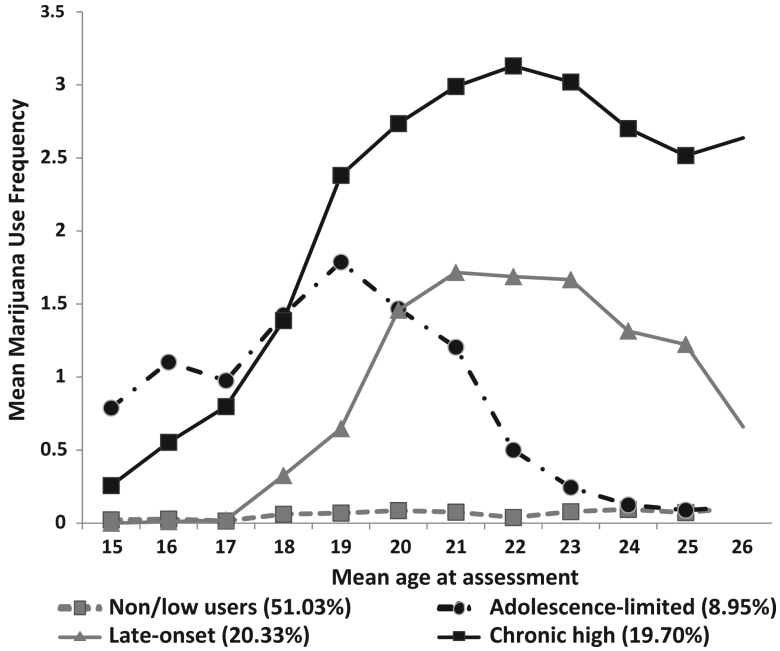

Fig. 1.

Mean frequency of past year marijuana use by age for each trajectory group. Note: 0 = no use (0 days), 1 = less than once per month (1–11 days), 2 = at least monthly but not weekly (12–51 days), 3 = 1–3 times per week (52–156 days), and 4 = more than 3 times per week (157–365 days).

Table 1

Description of life functioning outcomes.

Outcome	Description	*M* / %	(*SD*)
Educational and economic			
Socioeconomic status[a]			
Educational attainment	Highest grade: 7-point (1 = 9th grade or less; 7 = advanced degree)	4.0	(1.4)
Job prestige	10-point (0 = no job; 9 = executive/major professional)	3.7	(2.5)
Income category	13-point annual income (0 = $0; 12 = $100,000+)	5.6	(3.7)
Financially supports all children[b]	1 = provides support for all children; 0 = does not	87.5	
Relational, marital, and parenting			
Friends' criminal behavior[a]			
Theft	4-items; proportion of friends engaging in theft-related activities in past year (0 = none; 4 = all); summed across 4 items (truncated at 6); α = .89	1.3	(2.1)
Violence	3-items; proportion of friends engaging in violent activities in past year (0 = none; 4 = all); summed across 3 items (truncated at 4); α = .89	0.8	(1.2)
Drug dealing	1-item; proportion of friends engaging in drug dealing in past year (0=none; 4= all)	0.6	(0.9)
≥50% of friends use marijuana	1-item; proportion of friends using marijuana in past year (0 = none; 4 = all); binary item representing: 1 = 50% or more used; 0 = <50% used	36.0	
Poor social support[a]			
Attachment	4 items (e.g., "I lack a feeling of intimacy with another person"); α = .69 4-point (1 = strongly disagree; 4 = strongly agree);	7.2	(2.1)
Social integration	4 items (e.g., "There is no one who likes to do the things I do"); α = .76 4-point (1 = strongly disagree; 4 = strongly agree)	7.0	(1.9)
Reassurance of worth	4 items (e.g., "Other people do not view me as competent"); α = .72 4-point (1 = strongly disagree; 4 = strongly agree)	7.1	(2.0)
Alliance	4 items (e.g., "There is no one I can depend on for aid if I really need it"); α = .79 4-point (1 = strongly disagree; 4 = strongly agree)	6.6	(2.1)
Guidance	4 items (e.g., "There is no one I can turn to for guidance in times of stress"); α = .80 4-point (1 = strongly disagree; 4 = strongly agree)	6.7	(2.1)
Any intimate partner	1 = yes; currently has girlfriend/boyfriend, fiancé, spouse; 0 = no	75.0	
Currently married	1 = currently married; 0 = not currently married	40.1	
Partner uses marijuana[c]	1 = partner used marijuana in past year; 0 = partner did not use marijuana in past year;	23.6	
Poor relationship quality[a,c]			
Dyadic satisfaction	6 items (e.g., frequency partners considered separation or terminating the relationship) α =.78 6-point (0 = all the time; 5 = never)	4.9	(3.3)
Dyadic consensus	4 items (e.g., agreement with partners on topics such as religion, and career decisions) α = .77 6-point (0 = always disagree; 5 = always agree)	6.5	(4.3)
Dyadic cohesion	4 items (e.g., working with partners on a project) α = .78 6-point (0 = never; 5 = everyday)	8.0	(3.4)
Any biological children	1 = has biological children; 0 = no biological children	75.1	
Children by multiple women	1 = has children from 2 or more different women; 0 = has children from 0 or 1 woman	27.2	
No recent child visitation[b]	1 = participant has biological children that he has not seen in past month; 0 = participant has seen all biological children in past month	27.3	
Overall life satisfaction[a]			

Outcome	Description	*M* / %	(*SD*)
Satisfaction with life	1 item: how would you rate your overall satisfaction with life? 5-point (0 = not satisfied; 4 = extremely satisfied)	2.4	(1.0)
Happiness overall	1 item: how would you rate your overall level of happiness? 5-point (0 = not happy; 4 = extremely happy)	2.6	(0.9)
Perception of life overall	1 item: how would you rate your life overall these days? 11-point (0 = worst possible; 10 = best possible)	7.2	(1.6)

Notes: Based on observed (non-weighted) data.

[a] Latent variables represented by indicators directly below.

[b] Only applies to participants with a partner ($N = 306$).

[c] Only applies to participants with a biological child ($N = 304$).

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Table 2

Marijuana trajectory group differences on adult psychosocial outcomes before controlling for covariates.

	Low/nonusers (*n* = 233)		Adolescence-limited (*n* = 54)		Late increasing (*n* = 106)		Early chronic (*n* = 111)		Trajectory group	Race
	Pr/M	(*SE/SD*)	*Pr/M*	(*SE/SD*)	*Pr/M*	(*SE/SD*)	*Pr/M*	(*SE/SD*)	χ^2	*z*
Educational and occupational										
Socioeconomic status[a]	0.00_{b}	(0.93)	-0.35_{ab}	(0.87)	-0.07_{b}	(0.99)	-0.41_{a}	(0.66)	11.70**	−6.31***
Financially supports all children	0.93	(0.02)	0.86	(0.07)	0.92	(0.03)	0.90	(0.04)	2.23	−2.19*
Relational, marital, and parenting										
Friends' criminal behavior[a]	0.00_{a}	(0.51)	0.53_{b}	(1.09)	0.45_{b}	(1.08)	0.64_{b}	(1.05)	20.21***	3.20**
≥50% of friends use marijuana	0.20_{a}	(0.03)	0.34_{ab}	(0.08)	0.43_{bc}	(0.06)	0.58_{c}	(0.06)	34.80***	3.14**
Poor social support[a]	0.00	(1.81)	0.33	(1.76)	0.12	(1.76)	0.44	(1.70)	3.26	1.30
Any intimate partner	0.72	(0.04)	0.82	(0.06)	0.84	(0.04)	0.73	(0.05)	5.12	−2.06*
Currently married	0.47_{b}	(0.04)	0.42_{ab}	(0.09)	0.40_{ab}	(0.06)	0.26_{a}	(0.05)	9.50*	−3.70***
Partner uses marijuana	0.12_{a}	(0.03)	0.15_{ab}	(0.06)	0.27_{b}	(0.06)	0.49_{c}	(0.07)	27.78***	0.21
Poor partner relationship quality[a]	0.00	(2.81)	−0.10	(4.02)	0.38	(2.54)	0.94	(1.85)	6.36	0.06
Any biological children	0.71	(0.04)	0.82	(0.07)	0.80	(0.05)	0.77	(0.05)	3.39	3.11**
Children by multiple women	0.17_{a}	(0.03)	0.23_{ab}	(0.07)	0.28_{ab}	(0.06)	0.34_{b}	(0.05)	9.53*	5.76***
No recent child visitation	0.16_{a}	(0.03)	0.32_{ab}	(0.09)	0.23_{ab}	(0.05)	0.34_{b}	(0.06)	8.63*	3.25**
Overall life satisfaction[a]	0.00_{b}	(0.78)	-0.49_{a}	(1.17)	-0.24_{ab}	(1.03)	-0.30_{a}	(0.95)	9.50*	−2.03*

Note. Trajectory group Ns are unweighted and represent group sizes after classifying participants into their most likely class. Parameter estimates were calculated using weighting adjustment to account for the oversampling of at-risk adolescents. Predicted probability (*Pr*) of event occurrence and associated standard errors (*SE*) are reported for binary outcomes. Estimated means (*M*) and standard deviations (*SD*) are reported for continuous outcomes. Race effects contrast Black men vs. White/other men. Groups that do not have a common subscripted letter are significantly different at $p < .05$.

[a]Latent factor scores were centered at the mean of the Low/nonuser group.

*$p < .05$.

**$p < .01$.

***$p < .001$.

Table 3

Marijuana trajectory group differences on adult psychosocial outcomes after controlling for covariates.

	Low/nonusers (*n* = 233)		Adolescence-limited (*n* = 54)		Late increasing (*n* = 106)		Early chronic (*n* = 111)		Trajectory group	Race
	Pr/M	*SE/SD*	*Pr/M*	*SE/SD*	*Pr/M*	*SE/SD*	*Pr/M*	*SE/SD*	χ^2	*z*
Educational and occupational										
Socioeconomic status[a]	0.00	(0.73)	0.15	(0.98)	–0.07	(0.79)	–0.30	(0.47)	6.98	–5.03***
Financially supports all children	0.97	(0.02)	0.95	(0.03)	0.95	(0.02)	0.95	(0.03)	0.37	–2.36*
Relational, marital, and parenting										
Friends' criminal behavior[a]	0.00	(0.48)	0.12	(0.92)	0.34	(1.11)	0.40	(1.03)	5.82	3.91***
≥50% of friends use marijuana	0.21_{a}	(0.04)	0.28_{ab}	(0.09)	0.43_{bc}	(0.07)	0.58_{c}	(0.07)	19.95***	1.77
Poor social support[a]	0.00	(1.65)	–0.22	(1.53)	0.16	(1.66)	0.30	(1.68)	2.63	–0.29
Any intimate partner	0.68	(0.05)	0.88	(0.06)	0.84	(0.05)	0.77	(0.06)	6.50	–2.05*
Currently married	0.44	(0.05)	0.48	(0.11)	0.38	(0.06)	0.24	(0.06)	6.32	–3.43**
Partner uses marijuana	0.14_{a}	(0.04)	0.14_{a}	(0.06)	0.25_{ab}	(0.07)	0.43_{b}	(0.08)	12.69**	0.42
Poor partner relationship quality[a]	0.00	(2.63)	–0.33	(1.69)	0.39	(2.24)	0.84	(1.86)	6.05	–0.46
Any biological children	0.73	(0.05)	0.78	(0.09)	0.82	(0.05)	0.75	(0.06)	1.80	3.15**
Children by multiple women	0.16	(0.03)	0.19	(0.08)	0.28	(0.06)	0.32	(0.07)	6.28	4.62***
No recent child visitation	0.15	(0.04)	0.24	(0.09)	0.25	(0.06)	0.32	(0.08)	3.99	2.96**
Overall life satisfaction[a]	0.00	(0.74)	–0.26	(1.13)	–0.11	(0.93)	–0.06	(0.91)	1.35	–1.91

Note. Trajectory group Ns are unweighted and represent group sizes after classifying participants into their most likely class. Parameter estimates were calculated using weighting adjustment to account for the oversampling of at-risk adolescents. Predicted probability (*Pr*) of event occurrence and associated standard errors (*SE*) are reported for binary outcomes. Estimated means (*M*) and standard deviations (*SD*) are reported for continuous outcomes. Race effects contrast Black men vs. White/other men. Effects are after controlling for race, family SES, academic achievement, peer delinquency, depressed mood, and parent/child communication during early adolescence and co-occurring use of alcohol, tobacco, and hard drugs. Groups that do not have a common subscripted letter are significantly different at $p < .05$.

[a]Latent factor scores were centered at the mean of the Low/nonuser group.

*$p < .05$.

**$p < .01$.

$^{***}p < .001$.