Reasons High School Students Use Marijuana: Prevalence and Correlations With Use Across Four Decades

MEGAN E. PATRICK, PH.D.,^{a,b,*} REBECCA J. EVANS-POLCE, PH.D.,^c DEBORAH D. KLOSKA, M.A.,^c & JENNIFER L. MAGGS, PH.D.^d

^a*Institute for Translational Research in Children's Mental Health, University of Minnesota Twin Cities, Minneapolis, Minnesota*

^b*Institute of Child Development, University of Minnesota Twin Cities, Minneapolis, Minnesota*

^c*Institute for Social Research, University of Michigan, Ann Arbor, Michigan*

^d*Human Development and Family Studies, Pennsylvania State University, University Park, Pennsylvania*

ABSTRACT. Objective: Changes in the legality and prevalence of marijuana raise questions about whether adolescents' reasons for using marijuana and associations between reasons for use and recent marijuana use have changed historically. **Method:** Using nationally representative data from Monitoring the Future for 1976–2016 ($N = 39,964$; 47.6% female), we examined changes in self-reported reasons for marijuana use and in the associations between reasons for use and past-30-day marijuana use among 12th graders who used marijuana in the past 12 months. **Results:** Time-varying effect modeling showed variation in reasons for use among adolescent past-year marijuana users from 1976 to 2016. Social/recreational reasons for marijuana use (i.e., Boredom, Feel Good/Get High, Experiment, Fit In) generally declined in prevalence; the exception was Good Time, which remained quite stable. Prevalence of coping with negative affect reasons (i.e., Anger/Frustration, Escape

Problems, Relax, Get Through Day) approximately doubled across 40 years. Over time, social/recreational reasons were consistently associated with greater odds (i.e., Boredom, Feel Good/Get High, Good Time) or lower odds (i.e., Experiment, Fit In) of recent marijuana use. Coping with negative affect reasons, drug effect reasons, and compulsive use were consistently associated with greater odds of recent use. **Conclusions:** The most common reasons for marijuana use among high school students have shifted markedly in 40 years, with particular increases for coping-related reasons. However, reasons for use remain significant, stable predictors of use. This suggests a move toward riskier (coping-related) use but supports the continued salience of motivation-based approaches for prevention and intervention. (*J. Stud. Alcohol Drugs*, 80, 15–25, 2019)

SIGNIFICANT HISTORICAL CHANGES are taking place in terms of marijuana's legality and use. Beginning in 1996 in California, a growing number of jurisdictions in the United States have reduced legal penalties for medical and/or recreational marijuana use (National Conference of State Legislatures, 2017a). Since 2017, 29 states along with the District of Columbia, Puerto Rico, and Guam have permitted some form of medical use of marijuana (National Conference of State Legislatures, 2017b); 8 states and the District of Columbia now also allow recreational use by adults (ages 21 and older), and 20 states have adult recreational-use bills pending (National Conference of State Legislatures, 2017b). These changes run in parallel to historic trends in population prevalence (Azofeifa et al., 2016a). Among adolescents, the prevalence of marijuana use has shown marked historical shifts over time. The nationally representative Monitoring the Future (MTF) data on high school seniors show a peak in marijuana use in the late 1970s, declines across the 1980s, then modest increases through the start of the millennium, with less change since (Lanza et al.,

2015; Miech et al., 2017). The nationally representative National Survey on Drug Use and Health (NSDUH) data show increases in use among those ages 15–35 from the 1990s to 2009 (Miech & Koester, 2012), although no changes from 2012 to 2014 (Azofeifa et al., 2016b).

These changes in the legal status and prevalence of marijuana use may presage a shift in adolescents' reasons for using marijuana over time. For example, lower perceived risk is a key risk factor for use that remains strongly tied to marijuana use (Terry-McElrath et al., 2017), and perceptions of risk have been decreasing, especially among youth (Okane et al., 2015), although they vary across regions of the United States (Hughes et al., 2016). Changes in attitudes, including risk and disapproval of marijuana use, may be tied to the changing legal status of marijuana (Miech et al., 2015) or other state-level factors (Hasin et al., 2015). Furthermore, higher prevalence of marijuana use among peers and lower perceived risk could facilitate more casual experimentation with marijuana or use for social reasons. In contrast, during historical periods when support for and prevalence of

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*Correspondence may be sent to Megan E. Patrick at the University of Minnesota, Institute for Translational Research, 1100 Washington Ave. S, Suite 101, Minneapolis, MN 55415, or via email at: mpatrick@umn.edu.

marijuana use is lower, adolescents may experience fewer naturally occurring opportunities to use socially for fun and experimentation; the smaller number of users may do so for less common and more problematic reasons, such as coping with negative affect (Patrick et al., 2011a, 2011b, 2016). Differences over time in the endorsement of reasons for using marijuana are important because motivations for use are viewed in numerous theoretical models of substance use as among the most proximal risk factors through which other more distal factors (e.g., extraversion, affective tendencies) exert their influences (Cooper et al., 2016; Cox & Klinger, 1988). Empirical research supports these associations, with endorsement of specific reasons predicting both use and problems (Patrick et al., 2011a, 2016). In particular, using marijuana to cope is associated with higher levels of marijuana problems and dependence (Buckner et al., 2012; Fox et al., 2011; Lee et al., 2009; Patrick et al., 2011a, 2016; Simons et al., 2005).

The strength of associations of reasons with recent marijuana use may also vary over time, beyond shifts in absolute levels of reasons and use. Logically, at least three possible patterns of historical changes in associations between reasons and use patterns can be elaborated: (a) Links may become stronger when prevalence is more widespread (e.g., a person who uses marijuana to experiment and see what it's like, who enjoys using marijuana occasionally at parties, or who finds it relaxing might be more likely to act on these reasons if use is relatively common in that historical period; Patrick et al., 2016); (b) links may remain the same over historical time, despite changes in levels of both reasons and prevalence (e.g., a person who uses marijuana to cope or due to dependence reasons might remain relatively impervious to historical changes in prevalence; Patrick et al., 2016; Simons et al., 2005); and (c) links may decrease in size when marijuana use is more prevalent (e.g., strong reasons to seek out use might not be necessary motivations if marijuana is widely available or a ubiquitous part of social life; Lee et al., 2009; Patrick et al., 2016).

Methods for examining changes over time in prevalence and in associations between predictors and use have generally required researchers to group together years of data and examine discrete differences rather than smooth or gradual changes across continuous time. Therefore, we know very little about how changes over time have unfolded, particularly with regard to the associations between key predictors and substance use. Time-varying effect modeling (TVEM) provides a new option for examining changes over time, allowing empirical examination of how reasons for marijuana use, and use itself, have fluctuated over time. If large historic shifts in the strength of associations of reasons with use have occurred, extant knowledge about proximal risk factors may need important updating. On the other hand, if these links between reasons for use and marijuana use have remained largely unchanged across historical time (despite

shifts in prevalence), this suggests that much of what is already known about prevention and intervention regarding substance use based on motivations will continue to be useful for harm prevention and public health promotion.

Current study

The study addressed two research aims. We examined the extent to which, among high school seniors who reported using marijuana in the past year, there was change from 1976 to 2016 in (a) self-reported reasons for marijuana use and (b) associations between reasons for use and current (past-30-day) marijuana use.

Method

Sample

Data for this study are from the MTF study (Miech et al., 2017). Since 1976, MTF has annually surveyed nationally representative samples of about 15,000 12th-grade students in 130 high schools across the conterminous United States. The MTF sample is selected via a three-stage sampling design: geographic region, schools within geographic region, and students within schools (Bachman et al., 2015). Student response rates average 83%, with nonresponse mostly attributable to absenteeism; less than 1% of students decline participation. Students complete one of five (1976–1988) or six (1989–2016) randomly distributed forms of the survey in a classroom setting.

Respondents available for analysis were those from 1976–2016 who completed the single survey form on which the measures of interest were included and who completed questions about reasons for using marijuana (asked only of those who reported using marijuana in the past 12 months; descriptives are shown in Table 1). Of the 114,287 possible respondents, 55,286 reported no lifetime marijuana use, 11,908 reported lifetime marijuana use but no marijuana use in the past 12 months, 6,000 reported marijuana use in the past 12 months but did not provide data on their marijuana use reasons, and 1,129 did not provide data on 30-day marijuana use. The analytic sample ($N = 39,964$) was 47.6% female; self-identified race/ethnicity was 70.9% White, 8.4% Black, 6.9% Hispanic, and 13.8% multiple or other races/ethnicities. Based on inclusion criteria, all participants reported having used marijuana at least once in the prior 12 months.

Measures

Marijuana use. Past-12-month and past-30-day marijuana and hashish use were measured with the questions, “On how many occasions (if any) have you used [marijuana, hashish] . . . during the past 12 months? . . . during the past 30 days?”

TABLE 1. Sample descriptives^a

Variable	%	[95% CI]
Gender		
Male	52.4%	[51.7, 53.2]
Female	47.6%	[46.8, 48.3]
Race/ethnicity		
White	70.9%	[69.8, 72.0]
Black	8.4%	[7.7, 9.1]
Hispanic	6.9%	[6.3, 7.5]
Other races ^b	13.8%	[13.3, 14.4]
Parental education		
High school or less	35.2%	[34.1, 36.2]
At least one parent has some college education	64.8%	[63.8, 65.9]
Marijuana use reasons (aggregated from 1976 to 2016)		
Social/recreational reasons		
Because of boredom, nothing else to do	28.9%	[28.4, 29.5]
To feel good or get high	74.8%	[74.3, 75.4]
To have a good time with my friends	66.3%	[65.7, 66.9]
To experiment—to see what it's like	62.8%	[62.2, 63.4]
To fit in with a group I like	10.2%	[9.8, 10.5]
Coping with negative affect reasons		
Because of anger or frustration	17.4%	[16.9, 17.9]
To get away from problems or troubles	24.1%	[23.5, 24.6]
To relax or relieve tension	51.5%	[50.7, 52.3]
To get through the day	9.8%	[9.5, 10.2]
Drug effect and compulsive reasons		
To decrease (offset) the effects of some other drug(s)	2.6%	[2.4, 2.8]
To increase effects of some other drug(s)	12.8%	[12.3, 13.2]
To seek deeper insights and understanding	18.4%	[17.8, 18.9]
Because I am “hooked”—I have to have it	3.7%	[3.5, 4.0]
30-day marijuana use		
No occasions of 30-day use	35.3%	[34.7, 36.0]
Any occasions of 30-day use	64.7%	[64.0, 65.3]

Notes: CI = confidence interval. ^aUnweighted $N = 39,964$, except for sex ($n = 36,795$) and parental education ($n = 35,842$) because of missing data on these variables. Statistics are calculated incorporating the complex sample design and weighted for unequal probability of selection. ^bIncludes multiple selections, in years available, and missing data on race/ethnicity.

Response options were *no occasions*, *1–2 occasions*, *3–5 occasions*, *6–9 occasions*, *10–19 occasions*, *20–39 occasions*, and *40 or more occasions*. Separate responses for marijuana and hashish were combined. For the main analysis, responses were dichotomized to indicate 0 = *no marijuana/hashish use in the past 30 days* or 1 = *any marijuana/hashish use in the past 30 days* to focus on current use. Supplemental analyses used the full distribution of frequency of marijuana use in the past 12 months.

Reasons for marijuana use. For respondents who reported marijuana or hashish use in the past 12 months, a list of 13 reasons for use (Table 1) was presented, preceded by the question, “What have been the most important reasons for your using marijuana or hashish? (Mark all that apply.)” Reasons were grouped into conceptual categories (Johnston & O’Malley, 1986; Patrick et al., 2011b; Terry-McElrath et al., 2009). Social/recreational reasons included because of boredom, nothing else to do (Boredom); to feel good or get high (Feel Good/Get High); to have a good time with my friends (Good Time); to experiment—see what it’s like (Experiment); and to fit in with a group I like (Fit In). Coping

with negative affect reasons included because of anger or frustration (Anger/Frustration); to get away from my problems or troubles (Escape Problems); to relax or relieve tension (Relax); and to get through the day (Get Through Day). Drug effect reasons included to decrease (offset) the effects of some other drug(s) (Decrease Other Drug Effect[s]); to increase the effects of some other drug(s) (Increase Other Drug Effect[s]); and to seek deeper insights and understanding (Seek Insight). Last, the compulsive reason was because I am “hooked—I have to have it” (Hooked). Each reason was coded as 1 = *endorsed* or 0 = *not endorsed*.

Analysis plan

TVEM was used to assess historical change in the prevalence of marijuana use and marijuana use reasons, and the change in the association of marijuana use and reasons to use marijuana (e.g., Lanza et al., 2014; Tan et al., 2012). TVEM is a regression-based method that allows the user to examine changes in outcomes and covariate associations over continuous time without the assumption of a parametric

FIGURE 1. Prevalence of past-12-month marijuana use in the full sample (dashed line) and prevalence of past-30-day use among users (solid line), 1976–2016. *Note:* The dashed line indicates past-12-month prevalence of marijuana use in the full sample (i.e., the percentage of the full Monitoring the Future sample eligible for the current analysis because they were also asked about reasons for use). The solid line indicates past-30-day prevalence of marijuana use among past-12-month users (i.e., the outcome variable in the analytic sample).

form (e.g., linear or quadratic). TVEM assumes only that the associations change over time in a smooth way (Lanza et al., 2014; Tan et al., 2012). Intercept and slope coefficients are estimated as continuous functions of time, and figures are used to represent the coefficient functions, along with point-wise 95% confidence intervals, across time (Cumming & Finch, 2005; Greenland et al., 2016). Significant associations are evident when the point-wise confidence intervals do not include the value of one.

To incorporate complex sample design information and sample weights in the TVEM models, the %WeightedTVEM macro (v2.6) (Dziak et al., 2017) was used (available for download at <http://methodology.psu.edu>). This macro uses SAS SURVEY procedures. TVEM estimates the coefficient functions as a series of splines, incorporating data from neighboring time points. To determine the model that best fits the data, a series of models using B-spline smoothing was used to select the optimal form of each coefficient function based on pseudo-likelihood information criteria (pseudo-AIC, pseudo-BIC) that balanced the tradeoff between model fit and parsimony.

Intercept-only models specifying the logistic option for %WeightedTVEM were used to examine the historical change in 30-day marijuana use prevalence and the prevalence of marijuana use reasons over time (log-odds were

converted to prevalence estimates). Logistic %WeightedTVEM was also used to examine the historical association of 30-day marijuana use and reasons to use marijuana from 1976 to 2016.

Results

Historical variation in 30-day marijuana use and reasons for using marijuana

Figure 1 presents the prevalence of marijuana use from 1976 to 2016, with the dashed line showing 12-month prevalence in the full sample (i.e., the percentage of the full sample eligible for the current study because they were also asked about reasons for use) and solid line showing past-30-day prevalence among past-12-month users (i.e., the outcome variable in the analytic sample). These patterns have been reported elsewhere (Miech et al., 2017).

Prevalence figures for the historical change in marijuana use reasons are presented in Figure 2. Panel 2A–Social/recreational reasons shows an overall decrease in the prevalence of these reasons for marijuana use from 1976 to 2016. The prevalence of using marijuana for Boredom was about 26.9% in 1976, increasing approximately 8 percentage points to a prevalence of 35.1% in 2007, when it began to decline to its

FIGURE 2A. Prevalence of marijuana reasons, 1976–2016. Social/recreational reasons.

current level of about 25.0%. Using marijuana to Feel Good/Get High remained fairly stable through about 2005 but, overall, decreased by about 15 percentage points from 79.6% in 1976 to 64.7% in 2016. The prevalence of using marijuana for having a Good Time remained quite stable (~64.0%) over the entire period. Using marijuana to Experiment showed a slight increase in prevalence from about 1980 to 1993, peaking at 68.5%, and has continued to decrease to 54.2% in 2016. Last, the prevalence of using marijuana to Fit In peaked in 1979 at 13.9% and has steadily declined to a prevalence of about 6.3% in 2016—dropping by more than half.

Panel 2B—Coping with negative affect reasons shows that endorsement of each of these reasons almost doubled between 1976 and 2016. The reported prevalence of using marijuana for Anger/Frustration increased from 12.4% in 1976 to 21.1% in 2016. Over this period, the prevalence of using marijuana to Escape Problems increased steadily from 17.8% to 30.6%. The prevalence of reporting marijuana use to Relax increased slightly from 1976 to 1980, from 39.9% to 44.1% and then, beginning in 1985, the prevalence increased steadily from 41.7% to its current high of almost 70.0%. The prevalence of reporting marijuana use to get through the day was around 7.0% from 1976 through 1992. Prevalence increased gradually until about 1998 and then more steeply until 2012, reaching a prevalence of 16.1%. The rate has steadied since 2012 and was 15.4% in 2016.

Panel 2C of Figure 2 presents the prevalence for drug effect and compulsive reasons. As with the coping with negative affect reasons, the rate of reporting using marijuana to

decrease other drug effect(s) nearly doubled. Specifically, between 1976 and 2001, prevalence of this reason increased from 1.8% to 3.4%. Since 2001, the rate decreased slightly to 2.2% by 2016. Using marijuana to Increase Other Drug Effect(s) slowly increased from 11.8% in 1976 to its peak of 15.8% in 1997. Endorsement of this reason began to decline sharply in 2004 to about 5.5% in 2016, a 10.3 percentage point drop. Last, the prevalence of using marijuana to Seek Insight showed an overall increase from 13.7% in 1976 to 30.7% in 2016. The steepest increase was between 2005 and 2016, with an increase of nearly 11 percentage points (20.0% to 30.7%). The compulsive reason, Hooked, exhibited one of the lowest levels of endorsement of any of the reasons, but it has varied over time, beginning in 1976 at about 2.5%, and peaking at 5.6% in 2005. There has been a slow decline to a prevalence of about 2.3% in 2016.

Historical variation in the association of 30-day marijuana use and reasons for use

Figure 3 presents the results of the time-varying association of marijuana use reasons and 30-day marijuana use among past-12-month marijuana users from 1976 to 2016. Solid lines in the figure panels represent the estimated strength of the association between past-30-day marijuana use and reasons to use marijuana over historical time. Dotted lines represent the point-wise 95% confidence intervals.

Figure 3A shows the associations between social/recreational reasons and past-30-day marijuana use. Overall,

FIGURE 2B. Prevalence of marijuana reasons, 1976–2016. Coping with negative affect reasons.

FIGURE 2C. Prevalence of marijuana reasons, 1976–2016. Drug effect and compulsive reasons.

FIGURE 3A. Time-varying association of reasons for marijuana use and the odds of 30-day marijuana use, 1976–2016. Social/recreational reasons.

endorsing use for the reasons Boredom, Feel Good/Get High, and Good Time was consistently associated with greater likelihood of past-30-day marijuana use. The strength of these associations remained fairly consistent across time. Boredom was associated with 2.1 to 3.0 times greater odds of past-30-day use, with odds peaking in 2016 ($OR = 3.0$) and lowest in 1994 ($OR = 2.1$). Feel Good/Get High had the most variation in its association with past-30-day marijuana use; the association was strongest in 1976 ($OR = 4.7$), weakened through 1999 ($OR = 2.8$), and then remained relatively steady through 2016 ($OR = 3.1$). The odds ratios (ORs) in the associations between having a good time and 30-day marijuana use ranged from 2.1 in 2001 to 3.0 in 1976. The two reasons Experiment and Fit In were associated with a lower likelihood of 30-day marijuana use over most of the period. The strength of the association showed little change over the time span. The OR for Experiment varied between 0.28 in 1976 and 0.43 in 2001 and was 0.32 in 2016. ORs for Fit In were only significant from 1978 to 2014 (with a range of 0.85 to 0.74 during these years).

Figure 3B presents the associations of coping reasons and the odds of 30-day marijuana use among past-12-month marijuana users. For the three reasons Anger/Frustration, Escape Problems, and Relax, the associations were positive and significant over the entire period of 1976–2016. Anger/Frustration weakened somewhat from 1976 ($OR = 2.3$) through 1992 ($OR = 1.9$), when it strengthened steadily through 2016 ($OR = 3.3$). The association of the reason Escape Problems with past-30-day use was steady throughout the entire period, with OR estimates ranging from 1.9 (1991) to 2.5 (1976). For the reason Relax, the strongest association with marijuana use occurred about 1979 ($OR = 4.0$), followed by a small drop in strength through 1993 ($OR = 2.8$) after which it increased slightly to 3.1 in 2016. Individuals who endorsed Get Through Day had odds of 30-day marijuana use that were 7.3 times greater than those who did not endorse this reason in 1976. This association declined through 1992 to about 3.9 times more likely and remained fairly steady through 2016 ($OR = 3.3$).

FIGURE 3B. Time-varying association of reasons for marijuana use and the odds of 30-day marijuana use, 1976–2016. Coping with negative affect reasons.

The drug effect and compulsive reasons and their associations with the odds of 30-day marijuana use are presented in Figure 3C. The reason Decrease Other Drug Effect(s) association ranged from 2.9 in 2016 to 6.9 in 2006. The large confidence intervals are an indication of the stable, low prevalence rates of this reason (1.8% in 1976; 2.2% in 2016). After an initial decline in the association of Increase Other Drug Effect(s) with 30-day marijuana use from 1976 (OR = 7.4) to 1984 (4.0), the association remained relatively stable through 2016 (OR = 3.9). Similarly, Seek Insight had little change in its association with the odds of 30-day marijuana use from 1976 to 2016 with estimates ranging only from 3.4 (1976) to 2.9 (2008). The association between the compulsive reason Hooked and 30-day marijuana use varied across time, ranging from 3.6 (2016) to 22.1 (1982) times greater odds of marijuana use.

Associations with frequency of use in the past 12 months

Supplementary analyses examined the associations between each of the reasons for use and frequency of mari-

juana use in the past 12 months (Supplemental Figure 1). The pattern of results was similar to those reported above. Associations between social/recreational reasons and frequency of past-12-month use for Boredom, Feel Good/Get High, and Good Time were positive. Using to Experiment was associated with less frequent past-12-month use, and Fit In was associated with less frequent use during most years. Coping reasons were all significantly positively associated with past-12-month use, with particular increases in Anger/Frustration and Escape Problems in recent years. Drug effect and compulsive reasons were all associated with more frequent past-12-month use, with increases over time in Seek Insight.

Discussion

This study provides novel information about how the prevalence of reasons for marijuana use has changed among high school seniors in the United States across the past 40 years, as well as how these reasons for use are associated

FIGURE 3C. Time-varying association of reasons for marijuana use and the odds of 30-day marijuana use, 1976–2016. Drug effect and compulsive reasons.

with recent marijuana use among past-year users. Overall, we find that the prevalence of reasons for use has varied markedly since the mid-1970s. However, reasons for use have remained significant and consistent risk factors over time. As a result, the extant knowledge and understanding of motivations as a key risk or protective factor for marijuana use remains highly relevant for prevention and intervention of marijuana use.

Although marijuana use has become less common, those adolescents who do use may be at a higher risk for continued use and related problems based on their self-reported reasons for using. Specifically, the coping reasons to use marijuana, including Relax, Escape Problems, and Get Through Day, have increased quite dramatically among marijuana users. It is interesting to note that the Seek Insight reason for using marijuana has also increased substantially over time. These increases have been fairly steady throughout the past 40 years, although endorsement of specific reasons (i.e., Get Through Day and Gain Insight) has accelerated in the past decade. The increase in the prevalence of coping reasons

for use is concerning in light of research showing that these reasons are associated with greater risk for continued use through adulthood and with future marijuana-related problems and disorder (Buckner, 2013; Buckner et al., 2007, 2012; Fox et al., 2011; Lee et al., 2009; Moitra et al., 2015; Patrick et al., 2016; Simons et al., 2005). Marijuana use prevention and intervention programs may need increasingly to address coping-related reasons and to suggest that an increase in problematic use may be on the historic horizon. Further, understanding and targeting motives for marijuana use may be helpful in treatment for those with a marijuana use disorder (Banes et al., 2014).

Conversely, using marijuana for social and recreational reasons has decreased among high school seniors over time. This trend is somewhat less consistent across all social and recreational reasons but is particularly evident for using to experiment and using to fit in. Using to experiment, in particular, is associated with a lower risk for continued use and future problems with marijuana use (as in previous research, e.g., Lee et al., 2009; Patrick et al., 2011a, 2016) and lower

risk for other substance use (Palamar et al., 2015). Thus, a decrease in using to experiment is troubling, again suggesting that adolescents who are using marijuana now are reporting riskier reasons for use. The decrease in social and recreational reasons coupled with an increase in coping reasons may have to do with the decreased prevalence in overall marijuana use among adolescents. That is, adolescents who are using may be more likely to be heavier users.

Although the reasons high school seniors use marijuana have changed, links with recent use are consistently significant and in expected directions across the four decades. Using because of compulsion (i.e., Hooked) is most strongly associated with use. Using marijuana for coping and drug effect reasons also remain consistent risk factors for recent use, whereas using to experiment is consistently a protective factor against more recent use. This is important in that the salience of these reasons as risk or protective factors is robust across time, supporting the consistent risk hypothesis. However, it also highlights the concern of increased prevalence of coping reasons and decreased prevalence of social reasons for marijuana use among high school seniors. Overall, these results suggest that although marijuana use today is less common among young people than in 1976, those who do use may be at a higher risk for continuing to use into adulthood and to have future problems associated with that use.

This study provides important information with many clear strengths, including consistent measurement of reasons for using marijuana and of marijuana use in annual nationally representative samples across four decades. However, there are also important limitations. First, the sample is limited to individuals in 12th grade; adolescents who dropped out of school are not included, and reasons for marijuana use may differ in this population. Second, the measure of reasons for use includes items that are conceptually grouped (consistent with previous studies, e.g., Patrick et al., 2011a, 2011b); however, subscales of motivations for use were not available because the multidimensional measures used to examine motivations for marijuana use (e.g., the Marijuana Motives Measure; Simons et al., 1998) were developed after the data collection for this study began. Third, the study does not measure consequences of marijuana use. Previous literature has demonstrated the associations between reasons for use and later problems (e.g., Patrick et al., 2011a, 2016). Last, although the wording of the reasons-for-use items has not changed over time, the meaning of the items to high school senior participants may have shifted.

Future research should examine how other risk and protective factors for marijuana use, including perceived risk and availability (Miech et al., 2017; Terry-McElrath et al., 2017), have shifted over time and whether the strength of the associations between these factors and marijuana use has also remained steady. In addition, whether the combinations of reasons for use have changed over time remains an

important consideration for future investigation. Previous research has shown that latent classes of reasons for use are associated with marijuana use problems in adulthood (e.g., Patrick et al., 2016), and the extent to which the profiles of use have changed over time would be informative. Given the adverse health effects of marijuana (Volkow et al., 2014) and the central role of motivations for use as proximal predictors of use (Cooper, 1994; Cooper et al., 2016; Cox & Klinger, 1988), understanding how reasons for use and their associations with recent marijuana use may vary over time is informative for prevention and intervention efforts. Findings from the current study suggest that reasons for use remain important predictors of marijuana use, and although the prevalence levels of various reasons for use have fluctuated over time, their prediction of recent marijuana use has remained largely steady. This supports motivation-based approaches for marijuana prevention and intervention based on the accumulation of empirical findings over the past several decades.

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