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How and why have attitudes about cannabis legalization changed so much?

by

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ABSTRACT

Since the late 1990s public opinion about cannabis legalization has become drastically more liberal, and some states have begun to legalize cannabis for recreational use. Why have attitudes changed so much? Prior research has considered a few of the reasons for this change, but this is the first comprehensive and empirically-based study to consider the wide range of potential causes for how and why this happened. We use data from the General Social Survey, National Study of Drug Use and Health, and word searches from the *New York Times*. We find that attitudes largely liberalized via intracohort changes. Most Americans developed more liberal views, regardless of their race and ethnicity, gender, education, religious or political affiliation, or religious engagement. Changes in cannabis use have had minimal effects on attitudes, and legalization of cannabis has not prompted attitude change in neighboring states. As to root causes, evidence suggests that a decrease in religious affiliation, a decline in punitiveness, and a shift in media framing all contributed to changing attitudes.

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Americans' attitudes about cannabis legalization have changed dramatically in the last twenty-five years, and the reasons are largely unknown. Between the late 1960s and early 1990s, pro-legalization attitudes fluctuated within a fifteen-point range from 12 to 27 percent approval. Since the early 1990s, the proportion of the public in favor of legalization has risen at approximately 1.5 percentage points a year (calculations shown below). Trends in attitudes have been reflected in the punitiveness of state laws. During the 1980s concerns about cannabis were part of the escalation in the "War on Drugs" (Harcourt and Ludwig 2007; Tonry 2004). When attitudes became more disapproving in the early 1980s, legal punishment for carrying cannabis became harsher, whereby possession of 100 cannabis plants now had the same punishment as 100 grams of cocaine (Golub, Johnson, and Dunlap 2007).

Cannabis was also part of the "Three Strikes" sentencing laws, requiring life sentences in many states for repeat drug offenders (Caulkins and Chandler 2011; McCoy and Krone 2002). As Americans' views began to liberalize, so did state-level legislation (Weitzer 2014). In 1996 California became the first state in the union to legalize medical cannabis. By 2017, 21 states had legalized cannabis for medical purposes, and eight states (plus DC) had legalized the recreational use of cannabis.¹

Clearly cannabis-related attitudes and laws have become more liberal since the 1990s. But why did they change? While some studies have considered a few of the factors that have shaped public opinion (Maričić, Sučić, and Šakić 2013; Meares 1997; Nielsen 2010), there has not yet been an empirical study examining the wide range of possible explanations for why attitudes have liberalized. Understanding the factors shaping attitudes would provide insight into why what was once widely perceived as radical is now increasingly the norm.

This is the most thorough study to date examining why attitudes about cannabis have changed. We draw on data from the General Social Survey (GSS), the National Survey on Drug Use and Health (NSDUH), and a content analysis of the *New York Times*. We also include a new data source – individual and state-level identifiers from the GSS – to test the relationship between state-level cannabis-related legislation and changes in attitudes. We find that attitudes largely liberalized via intracohort changes. Most Americans developed more liberal views, regardless of their race and ethnicity, gender, education, religious or political affiliation, or religious engagement. Changes in cannabis use have had minimal effects on attitudes and legalization of cannabis has not prompted attitude change in neighboring states. As to root causes, evidence suggests that a decrease in religious affiliation, a decline in punitiveness, and a shift in media framing all played contributing roles.

Previous work

As noted above, support for the legalization of cannabis has increased substantially since the 1980s. Figure 1 uses repeated cross-sectional data from the General Social Survey and from Gallup polls to show that support increased through the mid-1970s, fell in the 1980s, and increased again after the early 1990s. By the 2010s, over 50% of Americans supported legalization.

[Figure 1 about here]

While there are a wide range of potential reasons why Americans' attitudes changed, to date most studies have focused on only one or two factors. Nielsen (2010) and Miech and Koester (2012), for example, were some of the first scholars to notice the liberalization trend. Nielsen (2010) also found more evidence for period effects than cohort effects, suggesting that people of all ages were changing their minds at roughly the same rate. However, Nielsen's data extended only until 2006.

Some researchers have also found that reading newspapers and watching television were associated with increasingly liberal drug-related views (Nielsen and Bonn 2008; Stringer and Maggard 2016). A lot of attention has also been given to research within individual states, some of which focuses on how cannabis-related legislative changes have affected attitudes and use (Friese and Grube 2013; Khatapoush and Hallfors 2004; Miech et al. 2012; Schuermeyer et al. 2014).² But these studies cannot address why laws and attitudes changed initially or what factors may have contributed to changing views across the nation because they focus largely on legislative changes within a single state.

We know of only two studies that have tried to unravel the multiplicity of factors that could explain more liberal views across the nation. The first is a report published by Brookings that examined Pew public opinion data from 2010 and 2013 (Galston and Dionne 2013). The other is a book chapter that provides a largely narrative account of the possible reasons for attitude change (Musgrave and Wilcox 2013). While both are insightful, neither one assesses the wide range of factors that could have shaped attitudes since the 1980s across the country.

Our study proceeds by first establishing the extent to which attitudes have changed through period effects versus cohort replacement. We then look at whether some groups of people (e.g., more religious, Republicans, women, whites, people living in closer proximity to places where marijuana was legalized in some way) have been more likely to change than others. Next, we consider a variety of causes. We consider distal causes, such as recent declines in religious affiliation, increases in the proportion of the population with a college-education, and changes in attitudes about punitiveness of the criminal justice system. We also consider proximate causes, such as increases in cannabis use, perhaps by aging Baby Boomers looking for more effective pain relief, changes in the perceived risk of using cannabis, as well as changes in the way cannabis is framed by the media.

Cohort succession vs. intracohort changes

One of the key factors for understanding the forces shaping attitudes is determining whether changes have been largely driven by cohort succession or intracohort changes. Cohort succession corresponds to the concept of “generations” whereby older cohorts are gradually replaced by newer ones that share similar social experiences and historical events (Alwin and Krosnick 1991; Brooks and Bolzendahl 2004). As one generation is replaced by the next, the population shift can result in attitudinal changes across the entire country. The alternative process is intracohort change whereby both older and younger people develop more liberal views during a similar time period.

Some prior research has examined cohort effects on changes in drug-related attitudes. Musto (1999) suggested that during the Reagan era of the 1980s anti-drug rhetoric may have influenced the cohort coming of age to be less supportive of drug legalization than preceding more liberal cohorts. In contrast to Musto’s work, Nielsen (2010) was unable to find such an effect for this cohort. Rather, she only found consistent differences in support for legalization for people born before World War II compared to those born after and no significant differences for the many cohorts born after 1945. Similarly, Musgrave and Wilcox (2013) identified eight distinctive cohorts (from “Flappers” to “Clintons”), finding that cohort effects had a strong influence on legalization support only until the 1980s, after which the support levels of Baby Boomers and subsequent cohorts moved in tandem. This previous work suggests that earlier in the 20th century there may have been cohort succession effects, whereby younger cohorts replaced older ones leading to more liberal views. However, later in the century both younger

and older people may have developed more liberal views about cannabis. These ideas lead to our first hypothesis:

Hypothesis 1: Changes in cannabis legalization support since the 1980s are largely the result of intra-cohort changes in attitudes as opposed to cohort succession.

Demographic differences

If cohort effects are not driving change, which intra-cohort changes might be responsible? As we explain below there are good reasons why the attitudes of some groups of people may have changed. Nevertheless, we suspect that changes between men and women and differences across various racial, political and religious groups are not the key for understanding American's relatively recent liberalization in attitudes.

Over the past four decades, researchers have consistently found that men are more likely to support cannabis legalization than women (Meares 1997; Saieva 2008; Toch and Maguire 2014). Compared to men women tend to have lower prevalence and frequency of cannabis use, and less personal use is associated with higher risk estimates and lower levels of legalization support (Maričić et al. 2013; Schepis et al. 2011; Trevino and Richard 2002). Some research has also suggested that mothers may be more likely to frame legalization as a family rather than an individual issue (Cubbins and Klepinger 2007; Musgrave and Wilcox 2013; Rienzi et al. 1996). As gender expectations and roles have changed, there is reason to think that women's attitudes on this issue might have begun to align more with men's views, explaining friendlier attitudes over the years. At the same time, there may be a small net effect if both sets of gender expectations have evolved in tandem.

Significant but less persistent gaps have also been found between political parties in their support for cannabis legalization. Since the early 1990s, independents have generally been most likely to support legalization, with Democrats a close second, and Republicans a distant third (Musgrave and Wilcox 2013; Timberlake, Rasinski, and Lock 2001; Toch and Maguire 2014). Although cannabis legalization is a policy position on which Democrats tend to disagree with Republicans (Geiger 2016; Motel 2015; Newport 2011), until recently this issue has not been central to most party platforms (Schwartz 2014).

Prior research and polls have also found modest racial differences in attitudes. African Americans tend to support legalization at slightly higher levels than other ethnic groups, with the lowest rates of support among Latinos (Chen and Killeya-Jones 2006; Galston and Dionne 2013; Geiger 2016). African-Americans have been found to think about issues like cannabis legalization in group terms using what Dawson (1995) called a "racial utility heuristic" – that is, evaluating whether the policy is good or bad for their community as a whole (Musgrave and Wilcox 2013). While we suspect that there will be a racial gap in attitudes, it is unlikely that this gap has widened or that change within one racial group is disproportionately responsible for overall changes.

People with different levels of education are also likely to differ in their views. In the 1970s, the college-educated were more likely to favor legalization than were others, but in the early 1990s the gap narrowed (Musto 1999; Nielsen 2010; Ours and Williams 2007). Some research has suggested that the relationship between education and legalization support may be curvilinear, with more education associated with less support until college, after which education is associated with greater support (Saieva 2008). While we suspect that more educated individuals will be more supportive, it's unlikely that the gap has widened since the 1980s.

Finally, levels of support for cannabis legalization differ by religious identity, with conservative Protestants least likely to support it, Jews being most supportive, and Catholics in the middle (Merrill, Folsom, and Christopherson 2005; Rothwell and Hawdon 2008). These differences can be partially explained by differences in the interpretation of doctrine concerning substance use and ideological differences among religious denominations (Hoffmann and Miller 1997; Saieva 2008). People who are more engaged in their religion are also likely to be more disapproving of cannabis use (Adamczyk and Palmer 2008). We expect that these differences have remained largely the same since the 1980s.

Based on the above considerations, we expect attitudinal differences across groups which are reflected in our second hypothesis. We also hypothesize that over time the pace of change will be similar.

Hypothesis 2: Support for cannabis will differ for men and women, African Americans and whites, Democrats and Republicans, different religious groups, and for people with higher and lower levels of religious engagement.

Hypothesis 3: Changes in attitudes have occurred roughly to the same extent across genders, political parties, racial groups, religious groups, educational attainment and religious belief.

Composition effects of changing demographics

Pro-legalization sentiment could have increased in part because more liberal groups have become more prevalent in the population. Coinciding with the pro-legalization trend since the early 1990s was a threefold increase in the percentage of people claiming no religious affiliation. And as Rothwell and Hawdon (2008) found, a secular worldview is associated with greater tolerance of deviance, in particular cannabis use.

Given the positive relationship between education and pro-legalization attitudes, rising education levels could have contributed to changing attitudes as less educated cohorts died out and were replaced with more educated people. However, this effect is likely to account for only a few percentage points of change at most, since the percentage of the population that is college-educated has increased less than 8% since 1992 (our calculation).

Hypothesis 4: Changes in attitudes have resulted partly from increases in the percentage of the population that is religiously unaffiliated and/or an increase in the proportion that has graduated from college.

Changes in cannabis use

Studies have found that people who used cannabis regularly at some point are much more likely to support legalization and decriminalization than people who used only occasionally or less (Cerdá et al. 2012; Friese and Grube 2013; Maričić et al. 2013). One reason may be that regular users perceive lower risks from cannabis (Andersson et al. 2009; Okaneku et al. 2015; Wall et al. 2011). If cannabis use has increased since the 1980s, this could explain attitude liberalization. These ideas lead to our next hypothesis.

Hypothesis 5: Changes in attitudes are partially the result of increases in cannabis use.

Diffusion of attitudes across states

As noted above, social scientists have looked at whether legislative changes (e.g., a state making medical cannabis legal) affect attitudes or vice versa (Caulkins and Chandler 2011; Marion and Hill 2016; Page and Shapiro 2010). The findings show that attitudes typically drive legislative changes. However, as states have become more liberal and legalized cannabis, residents in neighboring states may have become more tolerant. Likewise, access to cannabis from states that allow for medical cannabis could affect the attitudes of residents living nearby, helping them see cannabis as something that is not as problematic as expected. These ideas lead to the following hypothesis:

Hypothesis 6: Changes in attitudes have diffused across states, whereby states that have legalized medical cannabis and have more supportive residents have influenced the attitudes of people in neighboring states.

Medical framing of cannabis

One commonly cited explanation for changing attitudes about cannabis is the increasing extent to which it is framed in medical terms (Musto 1999; Pallone and Hennessy 2003; Sznitman and Lewis 2015). Media frames refer to how journalists simplify complexity by invoking the preexisting cognitive schemas of their audience (Borah 2011; Entman 1993; Scheufele and Tewksbury 2006). Such intentional or unintentional media reframing of social issues influences how individual readers interpret information in news stories, which can then influence collective public opinion (Matthes 2009; McCombs 2018; Scheufele 1999).

Media framing research has shown that even minor changes in how the news presents a social issue can shape public perceptions (Barry, Brescoll, and Gollust 2013; Forsyth 2012; Lancaster et al. 2011). Research has also found that the negative media framing of cannabis and other drugs peaked in the “War on Drugs” of the mid-1980s, then decreased both in terms of the number of articles as well as media framing of cannabis as a negative, criminal issue in the late 1980s (Gonzenbach 1996; Johnson, Wanta, and Boudreau 2004). This reduction in anti-cannabis media coverage was followed by an increase in the framing of cannabis as a medical issue starting in the mid-1990s (Schwartz 2002; Stryker 2003; Vickovic and Fradella 2011). Studies by Nielsen and Bonn (2008) and by Stringer and Maggard (2016) found that support for legalization was correlated with exposure to media that framed cannabis in a positive way.

Although there has been some increase in tolerant attitudes toward other illegal drugs, since the mid-1990s this change has not been as dramatic as the increase in tolerance for cannabis (Millhorn et al. 2009; Nielsen 2010; Trevino and Richard 2002). Based on these ideas we expect that since the 1990s cannabis would be more likely than other drugs to be framed as a medical issue. Additionally, increases over time in the medical framing of cannabis should correspond with increasingly positive attitudes about cannabis, thus suggesting that the medical framing may have, in part, led to more positive views. As the medical frame has become more popular, we would expect media discussions about cannabis to be decoupled from those related to other illegal drugs such as cocaine and heroin.

Hypothesis 7: As attitudes about cannabis changed, there was also a significant increase in the number of newspaper articles framing cannabis as a medical issue.

Hypothesis 8: Medical framing of other illegal substances has increased to a much lesser extent than the medical framing of cannabis.

Hypothesis 9: The media has become less likely to discuss illegal drugs such as cocaine and heroin in reports about cannabis.

Given the increasing extent to which cannabis is framed in medical terms, over time Americans should be less likely to see cannabis as harmful. A lot of research has found that legal substances, like cigarettes, may pose major health risks (Cummings and Proctor 2014; Pacheco 2011), possibly more than moderate cannabis use, which may lead some Americans to question the extent to which cannabis is problematic. Additionally, seeing cannabis as a drug for the medical treatment of pain is likely to affect views. If Americans are less likely to see cannabis as harmful, we would also expect them to be less likely to disapprove of it, which leads to our next hypothesis.

Hypothesis 10: As Americans increasingly see cannabis as less risky, they are also less likely to disapprove of it.

Changing views about the criminal justice system

In the 1990s people who used or sold illicit drugs came under heightened scrutiny from law enforcement. Possession of small amounts of drugs could lead to a jail sentence (Harcourt and Ludwig 2007). In 1994 several states began adopting a version of the “Three Strikes” law whereby people who were convicted of three felonies could be sent to prison for life (Lock, Timberlake, and Rasinski 2002). At this time California implemented a particularly harsh version whereby even misdemeanors could qualify someone for a lifetime prison sentence (Kovandzic, Sloan, and Vieraitis 2002). Over time this tough-on-crime approach led to the mass incarceration of people convicted of drug-related crimes, most notably cannabis (Tonry 2001). Over the last twenty years the number of arrests for cannabis possession has been greater than for any other drug violation (Borden, Root, and Goldman 2016). By removing a high proportion of people (mostly men) who could provide important financial, social, and family support, a number of studies have found that cannabis-related mass incarceration has had a detrimental effect on families and local communities (Rose and Clear 2003; Sampson and Loeffler 2010; Wakefield and Wildeman 2014).

Both the media and social science research have given a lot of attention to the problems with mass incarceration (Ramirez 2013), especially as it relates to cannabis possession. Legislatures have begun to respond. Hence, in a 2012 referendum, Californians voted for a more lenient version of the “Three Strikes” law (Albonetti 2016). It is possible that as more Americans began to view the criminal justice system as unreasonably harsh, they also tempered their views about cannabis, leading to greater tolerance (Tonry 2004). These ideas lead to our final hypothesis:

Hypothesis 11: As more Americans have come to believe that the criminal justice system is too harsh, they have become more supportive of legalizing cannabis.

Data

To test our hypotheses, we draw on three datasets: the General Social Survey (GSS), the National Survey on Drug Use and Health (NSDUH), and articles from the *New York Times*. We discuss each of these datasets below. Descriptive statistics for GSS and NSDUH are in Table 1.

[Table 1 about here]

The General Social Survey (GSS) is a nationally representative cross-sectional survey that has been conducted 30 times between 1972 and 2016. We use a subset of the GSS in which respondents were asked: “Do you think the use of cannabis should be made legal or not?” This question is part of the replicating core of questions asked in the same way every year. Respondents were given the option of saying yes or no. Overall, about 5% of respondents volunteered that they “didn’t know.”³ We also used survey year, age, foreign-born, gender, political party, race/ethnicity, college attainment, religion, religious service attendance and views about the criminal justice system. Survey year and age were used to compute the respondent’s year of birth. The foreign-born variable was based on yes or no answers to the question “Were you born in this country?” Political party identification was based on responses to the question: “Generally speaking, do you usually think of yourself as a Republican, Democrat, Independent, or what?” The small number of respondents who identified with miscellaneous political parties were excluded from analysis. Race/ethnicity was measured using a combination of answers to survey questions about race and national origin: “What race do you consider yourself?” and “From what countries or part of the world did your ancestors come?” This coding resulted in four racial categories — white, Black, Hispanic and other race. College attainment was measured using a question about whether the respondent had a college degree or not. Religious affiliation was measured using the GSS’s coding of religious denominations into broad religious traditions (i.e., Evangelical, mainline Protestant, Black Protestant, Catholic, Jewish, and other religion) as formulated by (Steenland et al. 2000). Religious service attendance was measured with a nine-category response to the question: “How often do you attend religious services?” Responses were coded such that higher numbers indicated greater religious service involvement.

Finally, views about the criminal justice system were measured with recoded answers to the question: “In general, do you think the courts in this area deal too harshly or not harshly enough with criminals?” Available answer choices included: too harsh, about right and not harsh enough. We collapsed “about right” and “not harsh enough,” into one category, creating a dichotomy with “too harsh” as the other category. Overall, only 7% of respondents said the criminal justice system was too harsh. A less skewed measure would have been preferable, but this is the only measure of opinions about the criminal justice system as a whole that is asked in the same way for any significant period of time. Our choice of measure is consistent with other quantitative research (e.g., Posick, Rocque, and Rafter 2014; Warr 1995; Western and Muller 2013).

To examine the effect of changes in use on changes in attitudes, we use data from the National Survey on Drug Use and Health (NSDUH). NSDUH is the only nationally representative survey of the general population with questions on both attitudes and usage of cannabis that is conducted over a significant period of time. A version of this survey has been conducted annually since 1990. However, the introduction of a cash incentive in 2002 boosted response rates and changed prevalence rate estimates, compromising comparability to prior surveys. Thus, we limit our examination here to the period between 2002 and 2015. Our

dependent variable in the NSDUH was a variable about disapproval that asked respondents 18 years and older, “How do you feel about adults trying cannabis or hashish once or twice?” Only three answer choices were available: strongly disapprove, somewhat disapprove, or “neither approve nor disapprove.” We dichotomized responses by collapsing the former two disapproving responses and the latter neutral (non-disapproval) category.

Independent variables from NSDUH included self-reported cannabis use and perceived riskiness. Regarding use, respondents were asked “How long has it been since you last used marijuana or hashish?” We collapsed answers into three categories: within the last year, previous to the last year, and never. Regarding risk, respondents were asked, “How much do people risk harming themselves physically and in other ways when they smoke marijuana once or twice a week/ once a month? Answer categories ranged from “no risk” to “great risk.” We replaced answer categories on both questions with numbers 1 through 4 and then took the average.

For our analysis of newspaper articles, we obtained metadata for all *New York Times* news articles with cannabis, cocaine or heroin as a subject term from the Proquest Newstand database (Proquest) between January 1, 1983 until October 2, 2016. Metadata included date of publication, title, and the aforementioned subject terms, which had been recorded by the *New York Times* Company.

Methods

We test our hypotheses in the order they were presented in the literature review. We test

Hypothesis 1 using a decomposition technique demonstrated by Firebaugh (1997, p. 22; Table 4.1) on data from the General Social Survey. This technique estimates the extent to which change happens through people changing their minds and the extent to which it happens through the replacement of older cohorts with differently-minded young people.

To examine

Hypothesis 2 and

Hypothesis 3, we ran six logistic regressions on data from the General Social Survey predicting attitudes about legalizing cannabis. Independent variables include the six variables relevant to these hypotheses, i.e., gender, political party, race/ethnicity (white, black, Hispanic), educational attainment (college vs. less than college), religion and religiosity (measured as religious service attendance), as well as age and whether the respondent was born in the United States. To assess whether effects varied over time, each regression includes an interaction between indicators for four-year intervals and one of the six key independent variables.

To test Hypotheses

Hypothesis 4,

Hypothesis 5,

Hypothesis 10, and 11, we estimated Oaxaca-Blinder decompositions using the Stata command *nldecompose* (Sinning, Hahn, and Bauer 2008). This method allows one to parse the change in Y into that which can be accounted for by: (1) change in X, (2) change in the association between X and Y, and (3) the interaction between (1) and (2). The effect of (1) is a measure of the extent to which changes in X can account for changes in Y (or vice-versa). The method uses regressions run on data from the beginning and end of the period.

For Hypotheses

Hypothesis 4 and 11, we used subsamples of the General Social Survey in 1991 (before the change in attitudes) and 2016 (the most recent year of the data). These decompositions involved logistic regressions predicting attitudes toward legalization by religious disaffiliation

(i.e., the percentage of people not reporting any religious affiliation) and on years of schooling on the one hand, and by attitudes toward the criminal justice system on the other. For Hypotheses

Hypothesis 5 and

Hypothesis 10, we used subsamples of NSDUH for 2002 and 2015 (i.e., first and last year of NSDUH with comparable data). Each NSDUH decomposition involved logistic regressions predicting whether a respondent disapproved of cannabis use or not. For Hypothesis

Hypothesis 5, the independent variables were two dummy variables indicating “use in the last year” and “use prior to the last year, with “never used cannabis” as the reference category. For Hypothesis

Hypothesis 10, the independent variable was an average of two measures of perceived risk described above.

To test

Hypothesis **6**, we ran logistic regressions of attitudes toward cannabis legalization using data from the GSS with information on the state in which respondents lived. Using information from NORML.org, we created variables indicating whether the respondent’s home residence or neighboring states had medical cannabis laws in the year the respondent was interviewed. Specifically, we computed three measures of relevant legislation in neighboring states: the proportion of neighboring states with medical cannabis laws, the number of neighboring states with medical cannabis laws and an indicator variable of whether any neighboring state had a medical cannabis law. In the regression analysis, we controlled for religious service attendance and political party as these were the most powerful predictors of attitudes toward legalization at the individual level based on our analysis for Hypothesis 2.

To evaluate Hypotheses

Hypothesis 7, Hypothesis **8** and Hypothesis **9**, we coded *New York Times* article subject terms provided by Proquest in several ways. First, we coded for whether a subject term referred to a medical use for the drug in question (i.e., cannabis, cocaine or heroin). Second, we coded for whether an article’s subject terms included one or more illicit drugs. For example, if subject terms indicated that an article was about cannabis and heroin, we noted that multiple drugs were referenced. Third, we coded subject terms referencing crime or law enforcement as such. We then tabulated the aforementioned codes by drug and by year. So for example, we calculated the number of articles about cannabis that referenced other drugs in 1984. In a chart, we juxtaposed trends in these figures with trends in attitudes toward cannabis from the General Social Survey between 1983 and 2016.

All models using the GSS and NSDUH adjust for clustered standard errors to account for sampling design. Missing data were listwise deleted for analyses with the GSS and NSDUH, which reduced sample sizes by 7% and 3.4%, respectively. The sizes of each sample are included in Table 1.

Results

We examine evidence for

Hypothesis 1 in Table 2. We parse total change within consecutive four-year periods into average intra-cohort change and cohort replacement. Average intra-cohort change is a mean of change within four-year birth cohorts weighted by cohort size. The table shows that cohort replacement accounts for relatively little of the changes in attitudes about cannabis legalization between the early 1990s and 2016 and plays a very minor role during the most recent period, offering support for our first hypothesis that changes in cannabis legalization support since the 1980s are largely the result of intra-cohort changes in attitudes as opposed to cohort succession. A separate analysis (available upon request) shows that the results of an analysis on two-year intervals from 1976-2016 are substantively similar to those presented in Table 2.

[Table 2 about here]

Figures 2 through 6 evaluate

Hypothesis 2 that legalization is more favorable to men, Democrats, African-Americans, the college-educated, people without a religious affiliation, and people who rarely or never attend religious services. Each dot represents the size of the unstandardized logistic regression coefficient for differences between groups during a given time period, while controlling for age, foreign-born, gender, race/ethnicity, education, political party, religious affiliation, and religious involvement. The vertical lines surrounding each dot represent 95% confidence intervals.

Figure 2 provides the partial effects of college education and gender on cannabis legalization. Whereas people with a college education were significantly more likely than others to support cannabis legalization in the 1970s, like the rest of the population, people with a college education became more conservative in the 1980s and then began to liberalize in the 2000s. Following the 1970s Figure 2 does not show any particularly large differences in attitudes between people who obtained at least a four-year degree and others. Somewhat similarly, while women generally appear less likely than men to support legalization, differences between the genders are not substantial and appear only marginally significant.

[Figure 2 about here]

Figure 3 shows how racial differences in pro-legalization attitudes vary over time. Other things equal, differences between blacks and whites are negligible throughout the period. Hispanics are generally similar to whites in the 1970s through the 1990s but diverge from whites in the 2000s and 2010s. Whites became more pro-legalization during this recent period, so it appears that most recently Hispanics have been bucking the pro-legalization trend.

[Figure 3 about here]

In Figure 4 we show the partial effects of religious affiliation compared to the general population by year, controlling for other factors, including frequency of religious attendance. Effects represent differences between each religious group and the grand mean of the sample for the given period. In the upper right-hand panel, one can see that Catholics are consistently statistically indistinguishable from the mean. Evangelical Protestants appear to have been more conservative in the 1970s but generally no different from the mean in later periods. Jews appear almost invariably somewhat more liberal than the average, but precise estimates are not possible owing to small samples in each period. Black Protestants too are not dissimilar from the mean. The overall conclusion is that changes in attitudes are occurring roughly the same extent across all religious groups.

[Figure 4 about here]

Figure 5 presents the partial effect of one standard deviation difference in religious service attendance on support for cannabis legalization. Religious service attendance consistently

has the most powerful effect on attitudes relative to the effects of other variables considered in Hypotheses 2 and 3. The effect is consistently negative and of roughly the same magnitude throughout the period.

[Figure 5 about here]

Figure 6 shows the partial effects of Democrats and Independents relative to Republicans over the period. There is little evidence of divergence here. Democrats and Independents are generally more in favor of legalization than Republicans are across the period, although the differences do not appear statistically significant in every year. In sum Figures 2 through 6 offer minimal support for

Hypothesis 2, but tentative support for

Hypothesis 3 that changes in attitudes have occurred roughly to the same extent across genders, political parties, racial groups, religious groups, and for people with different levels of educational attainment and religious belief.

[Figure 6 about here]

Regarding Hypothesis

Hypothesis 4, we find that the increase in the religiously unaffiliated accounted for about 12% of the change in attitudes about marijuana legalization since 1991. By contrast, the increased proportion of the population that is college-educated accounted for only 3.5% of the change. Thus, the former is a significant factor but cannot explain the bulk of the change. The latter is of marginal importance.

Regarding

Hypothesis 5, Figure 7 shows trends in attitudes about cannabis and usage rates among persons 18 years and older from 2002 – 2015. The proportion of adults in the survey who were neutral about (as opposed to disapproving of) cannabis use increased about one-third from 42% in 2002 to 56% in 2015. Past-year use rates also increased about one-third, from 10% in 2002 to 13.5% in 2015, but respondents reported fairly consistent prior usage rates during the period. In an Oaxaca-Blinder decomposition, we found that changes attributed to rates of use were statistically significant but quite small – less than 10% of the whole. There was a 28% difference between rates of non-disapproval between 2002 and 2015, but only about 2.2 percentage points (or $2.2\%/28\% = 8\%$) of this difference was attributed to changes in cannabis use. Changes in use rates affected too few people to have played more than a very minor role in attitude change, so we do not find much support for

Hypothesis 5. Of course, it's possible that changes in attitudes are motivating more people to use cannabis. But either way, this is a very small piece of the puzzle.

[Figure 7 about here]

Table 3 shows the effects of medical cannabis legislation in neighboring states on pro-legalization attitudes, testing

Hypothesis 6. Regardless of how we measure the influence of neighboring states, the effect is not statistically significant.⁴ Surprisingly, medical cannabis legislation in the state of residence does not approach statistical significance either. There is simply no evidence of geographically-concentrated influence from laws to attitudes within or between states.

[Table 3 about here]

Figure 8 offers some support for

Hypothesis 7, indicating there was a significant increase in the number of newspaper articles framing cannabis as a medical issue. In the early 1990s, there were increases in both the proportion of the public supporting legal cannabis and in the amount of coverage of cannabis as palliative care. The use of the medical frame in the *New York Times* rose during the 1990s and

then leveled off in the early 2000s. Pro-legalization attitudes rose throughout that period. Between 2012 and 2016, both medical framing and pro-legalization attitudes rose faster than they had over any other four-year period on record.

[Figure 8 about here]

Finding support for Hypothesis 8 and Hypothesis 9, Figure 9 shows trends in the proportion of articles in the *New York Times* reporting on issues related to cocaine, heroin and cannabis and the extent to which different drugs were discussed within the same article. The solid line in each of the three charts shows the proportion of articles in which drugs other than marijuana are also discussed. In contrast to cannabis, cocaine and heroin have rarely been framed in medical terms since 1982. And, while cannabis was generally discussed with other illicit drugs in the 1980s and early 1990s by 1994 it was much more likely to be discussed on its own. Cocaine and heroin show a similar trajectory, discussed with other illicit drugs in the 1980s and 1990s and independently since that time.

Regarding Hypothesis

Hypothesis 10, our decomposition found that changes in perceptions of risk for occasional and regular cannabis use accounted for 38% of the decrease in disapproving attitudes over the period 2002-2014. Regarding

Hypothesis 11, Figure 10 provides some support. In the early 1990s, attitudes about cannabis were changing but attitudes about the harshness of the criminal justice remained about the same. Then from the mid-1990s through 2016, while attitudes about cannabis liberalized further, the proportion of people who thought the justice system was too harsh quintupled. It is possible that changing attitudes about the criminal justice system played a role in shifting attitudes about cannabis, or that the causality could have moved in the other direction or in both directions. However, an Oaxaca-Blinder decomposition showed that changing attitudes about the criminal justice system could account for only 14% of the change in pro-legalization attitudes.

[Figure 9 about here]

Note too that the GSS measure of the criminal justice system is highly skewed, with only a small proportion feeling that it is too harsh. Hence, this measure may not be very sensitive to fine-grained changes in opinion. It is thus possible that attitudes about the criminal justice system as a whole have played a larger role in shaping attitudes toward cannabis than our analysis using the GSS measure can show.

[Figure 10 about here]

Conclusion

Over the last three decades public opinion swung from three-to-one against to two-to-one in favor of legalizing cannabis. Since the 1990s people across different sociodemographic subgroups largely changed their attitudes to a similar extent. We found only two exceptions – since 2006, Hispanics have changed less than whites, and Democrats started liberalizing earlier than Republicans did. Differences by religion, gender and education remained the same. Our analysis shows that all birth cohorts became more liberal over time.

We also found that attitude change occurred at about the same rate across regions of the country. There is no evidence that attitudes liberalized more in states where cannabis policy had changed nor in states adjacent to where policy had changed. This finding dovetails with Schmidt et al. (2016), who found that legalization of medical marijuana had no apparent effect on youth's attitudes about the riskiness of marijuana. Perhaps these null findings at the state-level are due to the fact that media-driven public consideration of cannabis policy change happened at the national level. In support of this, we conducted a preliminary analysis of trends in Google search

results for “marijuana” and found that interest in the subject in December 2012 rose no more in Colorado and Washington (where it was legalized at that time) or adjacent states, than it did in other parts of the country. The lack of findings for changes across states are consistent with our results more generally that Americans of various backgrounds changed their minds at essentially the same rate. Moreover, greater proximity to issues at the ballot box may engender stronger opinions about the topic in both directions; so indeed it may not prompt liberalization. Proximity could cause attitude divergence or hardening. We were unable to test for this possibility because the question about cannabis legalization is dichotomous. But this is an important area for future research.

We found that a decline in religious affiliation has a significant but small effect on changing attitudes, explaining about 12% of the increase in support. One reason why religious disaffiliation accounts for relatively little change is because its effect on attitudes is small. This may be due in part to the fact that religious identities are sometimes loosely held. An estimated one-fifth of people report inconsistent religious identities (Hout 2017). Fluid identities are unlikely to be very impactful. And many of those who disaffiliate from religion likely did not attend religious services much before they dropped their religious identity (Hout and Fischer 2014). If as Hout and Fischer (2014) find, religious disaffiliation is motivated in part by the increasing association of organized religion with political conservatism, and is not accompanied by changes in religious beliefs, it is unlikely to have much independent effect on attitudes in general, and attitudes about marijuana in particular.

We considered whether increases in use were associated with more approval. While use increased slightly between 2002 and 2014, the change was much too small to account for much of the large increase in public support for legalization. And our study shows that many Americans who have not recently used marijuana now support legalization. If more states legalize cannabis or people increase their use, these factors may affect attitudes, but this has not happened yet.

One influence that seems most plausible in contributing to changes in attitudes is an increase in the news media’s framing of cannabis as a medical issue. While the *New York Times* increasingly framed cannabis as palliative care, attitudes become more supportive of legalization. In contrast to cannabis, we did not find an increase in the medical framing of cocaine or heroin. Indeed, over the last twenty-five years almost no articles discussed cocaine or heroin in a health-related context. Also, for all three drugs – cannabis, cocaine, and heroin- the *New York Times* increasingly decoupled them, so that each was discussed by itself as its own topic and not as an example of one of many illegal drugs. By framing it as a health issue and not coupling it with other drugs, the American public would have increasingly been provided with a friendlier view of cannabis. Additionally, we show that a relatively high proportion of the change in views about the disapproval of cannabis are associated with a decrease in the percentage of people who see it as harmful (specifically, an estimated 38% of the decrease in disapproving attitudes over the period 2002-2014). Hence, changing views about the harmfulness of the drug, which seems to be reflected in the media, are associated with the drug being seen as less problematic over time.

Many Americans do not read the *New York Times*. Rather they get their news from local television and other sources with content very different from the *Times*. Newspaper circulations have declined since their peak in 1987 (Pew Research Center 2018), and social and technological changes have led news consumption patterns to transform dramatically over the decades of this study, especially among younger cohorts (Bialik and Matsa 2017; Coleman and McCombs 2007). However, when these legalization attitudes were really beginning to change in the 1990s,

newspapers were still a primary sources of news for many people (McCombs 2018). Further, the *New York Times* has been one of the top three most-read newspapers across this study period, and by 2016 it still had the second largest circulation in the country (Feldman, Hart, and Milosevic 2017; Pew Research Center 2018).

With no national newspaper representing Americans' views, researchers often use the *New York Times* in content analyses to provide insight into news framing and residents' attitudes (Brewer 2003; Dokshin 2016). Nevertheless, other newspapers and news sources, especially broadcast media or those from more conservative news outlets or different parts of the country, may not reveal the same increases in the medical frame. Future research should examine other newspapers, news outlets, and sources (e.g., books, sitcoms, movies) to assess the prevalence of the medical frame and whether it preceded attitudinal changes.

Once attitudes begin to change it is difficult to know what keeps the momentum going. We found that attitudes about cannabis became friendly *before* Americans began to feel that the criminal justice system was too harsh. As noted above, our measure of feelings about the justice system is far from ideal. Nevertheless, the findings suggest that changes in feelings about the justice system do not seem to be a major impetus for more supportive attitudes, associated with only about 14% of that change. However, more tolerant views of cannabis may have led to a preference for a more lenient criminal justice system that was heavily focused on cannabis possession. Likewise, as views on both of these issues began to change, there could have been reciprocal effects whereby changing views in one area (e.g., criminal justice system) reinforced changing views in the other (e.g., cannabis).

Our study examined many plausible and measurable factors that could have contributed to Americans' changing views. However, there are other factors that may explain changes, but the data are not available or easy to obtain. For example, as increase in internet usage could have provided more information about the risks and benefits of cannabis, ultimately affecting attitudes. Likewise, changing views about individual liberty and autonomy could have changed people's feelings about cannabis (Schnabel and Sevell 2017). Finally, celebrities⁵ who have publicly made clear their opposition to the "war on drugs" could have contributed to changes in public opinion. Future research might consider these and other influences to rule out or add as contributors that have helped propel friendlier views forward.

Previous studies of cannabis attitude change have focused on one or two factors (Miech and Koester 2012; Nielsen 2010) or suggested a range of influences without examining evidence for them (Galston and Dionne 2013; Musgrave and Wilcox 2013). This study advances our understanding of why attitudes changed through an empirical examination of a range of plausible explanations. As cannabis becomes legal in more places, it is likely to remain an important topic, and Americans' views are likely to liberalize further.

¹ This information is from: www.governing.com/gov-data/state-marijuana-laws-map-medical-recreational.html, accessed 11/12/17.

² One of the reasons for the popularity of studies that compare changes within a single state or one state to others is that the legalization of both medical and recreational cannabis varies across states, providing an opportunity for a quasi-experimental design, which is often unavailable to researchers who do work on public opinion.

³ The proportion of respondents saying they didn't know whether marijuana should be legalized rose from an average of 3% in the 1970s and 1980s to 5% in the 1990s and 7% in aughts and 2010's. Rising levels of ambivalence make sense given that media messages about marijuana

went from almost universally negative to a mix of positive and negative as states began legalizing the substance.

⁴ Using simulations, we estimated the power to find an effect of living adjacent to any state in which cannabis was legalized equal to 0.16 – the size of the effect of being a Democrat – at 83%.

⁵ We attempted to examine media coverage of celebrities in relation to marijuana and other illicit drugs in the *New York Times* archive. Unfortunately, an analysis was not feasible since we found celebrity names in only about 1% of this sample. (We searched for 980 US-based celebrity names from Pantheon 1.0, a manually verified dataset of famous people extracted from Wikipedia.).

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Table 1: Descriptive statistics for General Social Survey, National Survey of Drug Use and Health Survey, and *New York Times*

	Mean	St. Dev.	Min	Max
General Social Survey (n=27,570)				
Support for legalization	0.3	0.458	0	1
College-educated	0.475	0.499	0	1
Immigrant	0.085	0.279	0	1
Religious service attendance	4.883	2.72	1	9
Female	0.562	0.496	0	1
White	0.774	0.418	0	1
Black	0.137	0.343	0	1
Hispanic	0.058	0.234	0	1
Other race	0.031	0.172	0	1
Democrat	0.49	0.5	0	1
Independent	0.144	0.351	0	1
Republican	0.366	0.482	0	1
Evangelical	0.264	0.441	0	1
Mainline Protestant	0.197	0.398	0	1
Black Protestant	0.09	0.286	0	1
Catholic	0.257	0.437	0	1
Jewish	0.019	0.137	0	1
Other religion	0.055	0.228	0	1
Unaffiliated	0.117	0.322	0	1
Criminal justice system too harsh	0.073	0.26	0	1
Age	46.125	17.529	18	89
National Survey of Drug Use and Health (n=530,531)				
"Do not disapprove" of marijuana use	0.536	0.499	0	1
Used marijuana in the last 12 months	0.191	0.393	0	1
Used marijuana prior to the last 12 months	0.312	0.463	0	1
Risk of cannabis use (average of two four-point scales)	2.751	1.022	1	4
<i>New York Times</i> (n=6,191)				
Medical framing of marijuana (proportion per year)	0.264	0.197	0	0.60
Medical framing of cocaine (proportion per year)	0.038	0.041	0	0.18
Medical framing of heroin (proportion per year)	0.095	0.093	0	0.33

Table 2: Parsing total change in the proportion of adults who believe marijuana should be legal using the General Social Survey, 1976-2016

Period	Total change	Average	
		Intra-cohort change	Cohort replacement
1976-1980	-0.032	-0.054	0.022
1980-1984	-0.032	-0.056	0.024
1984-1988	-0.048	-0.052	0.004
1988-1992	0.091	0.056	0.035
1996-2000	0.063	0.049	0.014
2000-2004	0.03	0.028	0.002
2004-2008	0.024	0.019	0.005
2008-2012	0.086	0.072	0.014
2012-2016	0.132	0.106	0.026

Table 3: Logistic mixed regressions of pro-marijuana legalization attitudes on medical marijuana laws in the state of residence and in surrounding states using the General Social Survey, 1973-2010

	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6
Proportion of neighboring states with medical marijuana	-0.30** (0.12)	-0.18 (0.14)				
Number of neighboring states with medical marijuana			-0.05 (0.03)	-0.02 (0.04)		
Any neighboring state has medical marijuana					-0.06 (0.06)	-0.03 (0.06)
Medical marijuana in state of residence		-0.08 (0.08)		-0.12 (0.08)		-0.13* (0.07)
Service attendance		-0.21*** (0.01)		-0.21*** (0.01)		-0.21*** (0.01)
Democrat		0.16*** (0.04)		0.16*** (0.04)		0.16*** (0.04)
Other political party		0.41*** (0.12)		0.41*** (0.12)		0.41*** (0.12)
Republican		-0.25*** (0.04)		-0.25*** (0.04)		-0.25*** (0.04)
Constant	-1.13*** (0.11)	-0.18* (0.11)	-1.13*** (0.11)	-0.18* (0.11)	-1.14*** (0.10)	-0.18* (0.11)
Observations	30,916	30,916	30,916	30,916	30,916	30,916
Log Likelihood	-16,501.78	-15,589.86	-16,503.76	-15,590.41	-16,504.46	-15,590.47
Akaike Inf. Crit.	33,011.55	31,197.72	33,015.52	31,198.82	33,016.92	31,198.94
Bayesian Inf. Crit.	33,044.91	31,272.77	33,048.87	31,273.88	33,050.27	31,274.00

*=p<.05, **=p<.01, ***=p<0.001

Note: Reference group for political party is Independent. Standard errors are shown in parentheses.

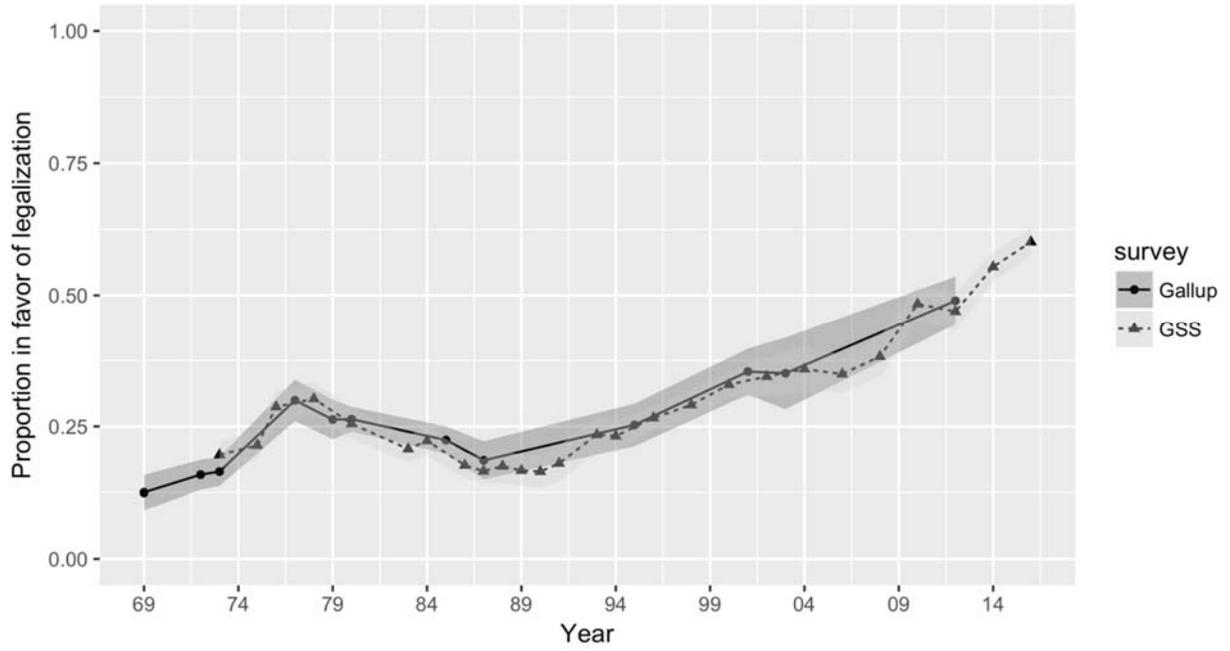


Figure 1: Trends in the proportion of adults in the United States who said they were in favor of legalizing marijuana using the General Social Survey and Gallup polls, 1969-2016
Note: Shaded regions indicate 95% confidence intervals.

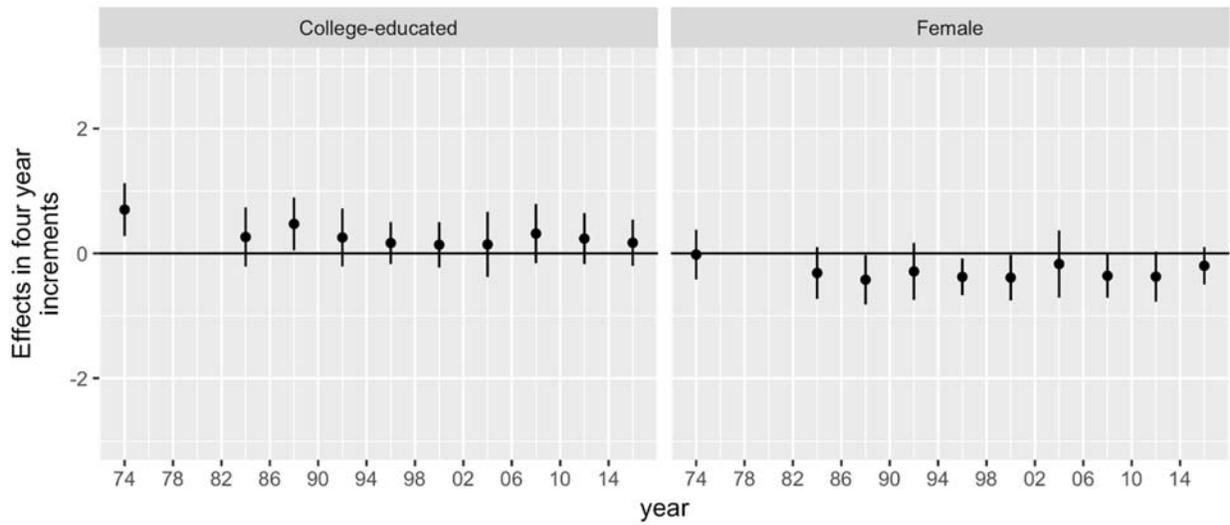


Figure 2: Partial effects of college education and gender on support for marijuana legalization using logistic regression on data from the General Social Survey, 1974-2016
Note: Controls for political party, age, race, birth nation (US versus other), religious identity and attendance are included. Vertical lines represent 95% confidence intervals.

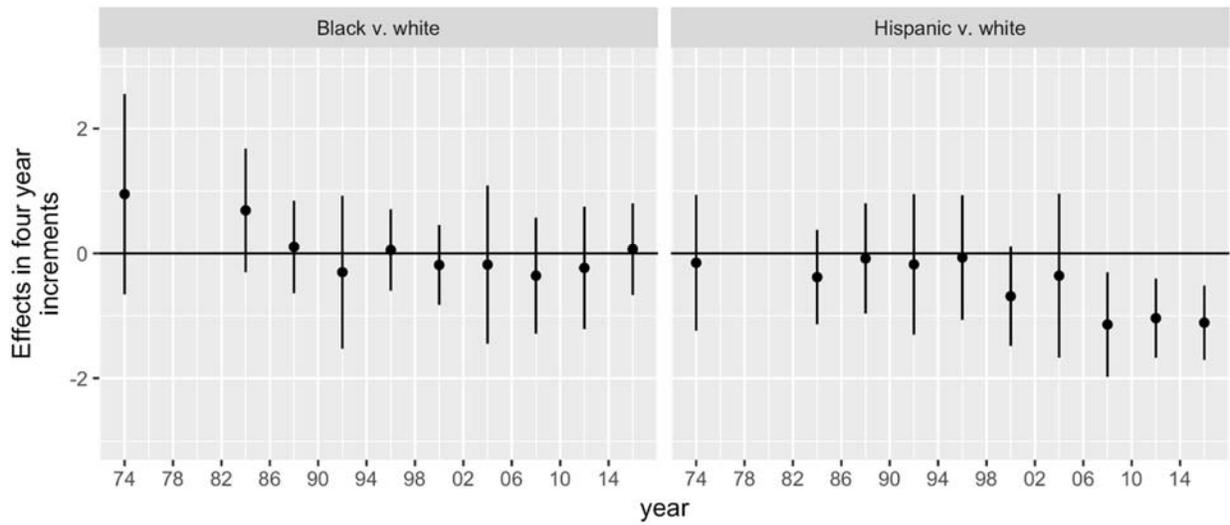


Figure 3: Partial effects of race/ethnicity on support for marijuana legalization using logistic regression on data from the General Social Survey, 1974-2016

Note: Controls for education, age, gender, political party, birth nation (US versus other), religious identity and attendance included. Vertical lines represent 95% confidence intervals.

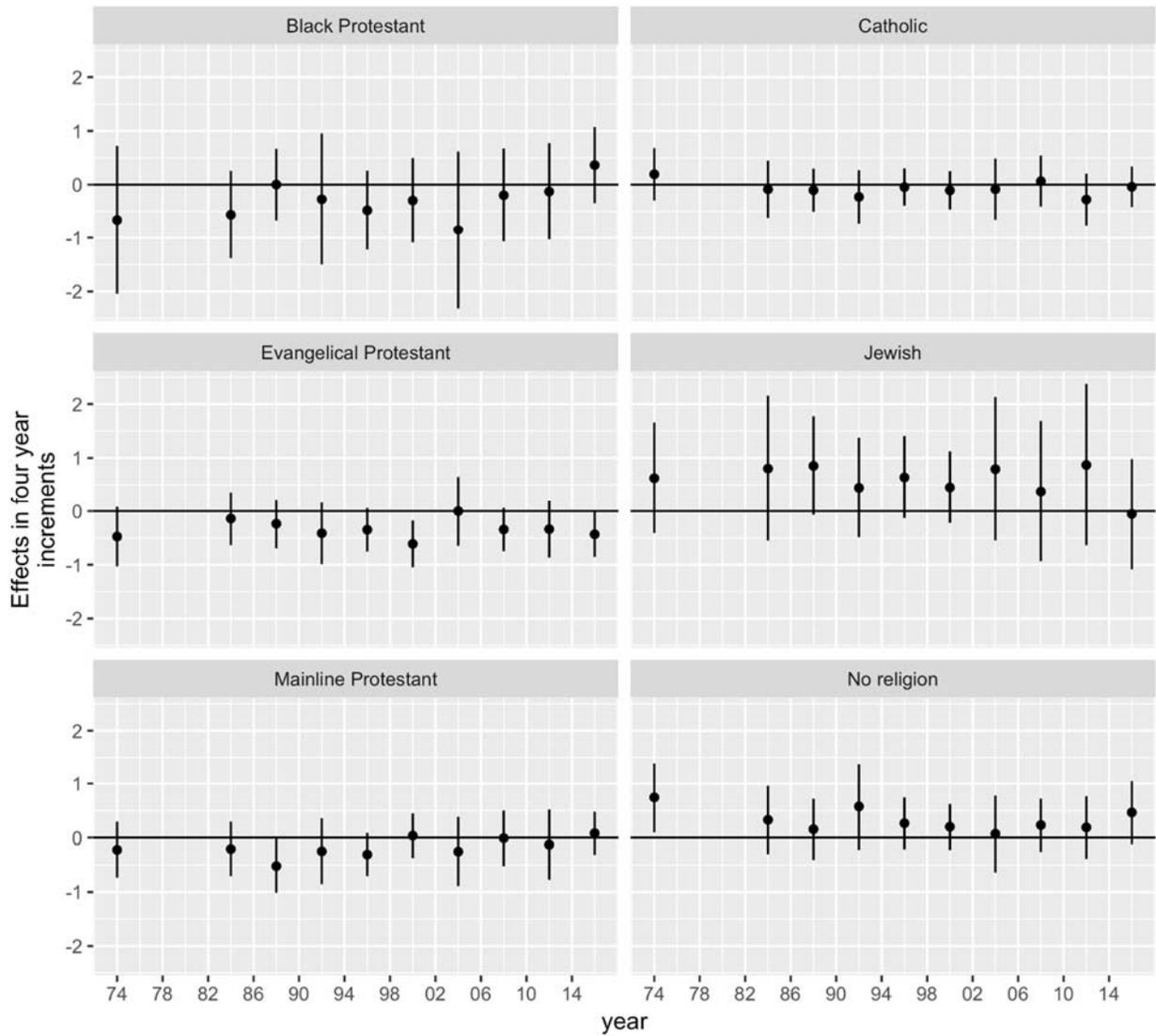


Figure 4: Partial effects of religious identity on support for marijuana legalization using logistic regression on data from the General Social Survey, 1974-2016
Note: Controls for education, age, birth nation (US versus other), gender, race/ethnicity, political party and attendance are included. Vertical lines represent 95% confidence intervals. Horizontal line represents x-axis (Y=0), or no effect.

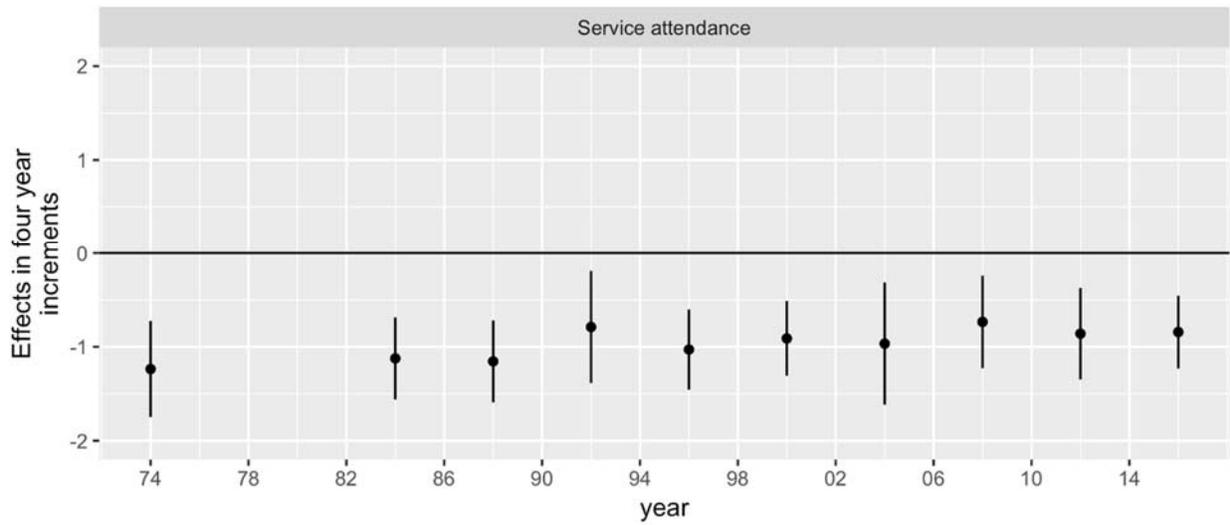


Figure 5: Partial effects of religious service attendance on support for marijuana legalization using logistic regression on data from the General Social Survey, 1974-2016

Note: Controls for education, age, gender, birth nation (US versus other), race/ethnicity and religious identity and political party are included. Vertical lines represent 95% confidence intervals.

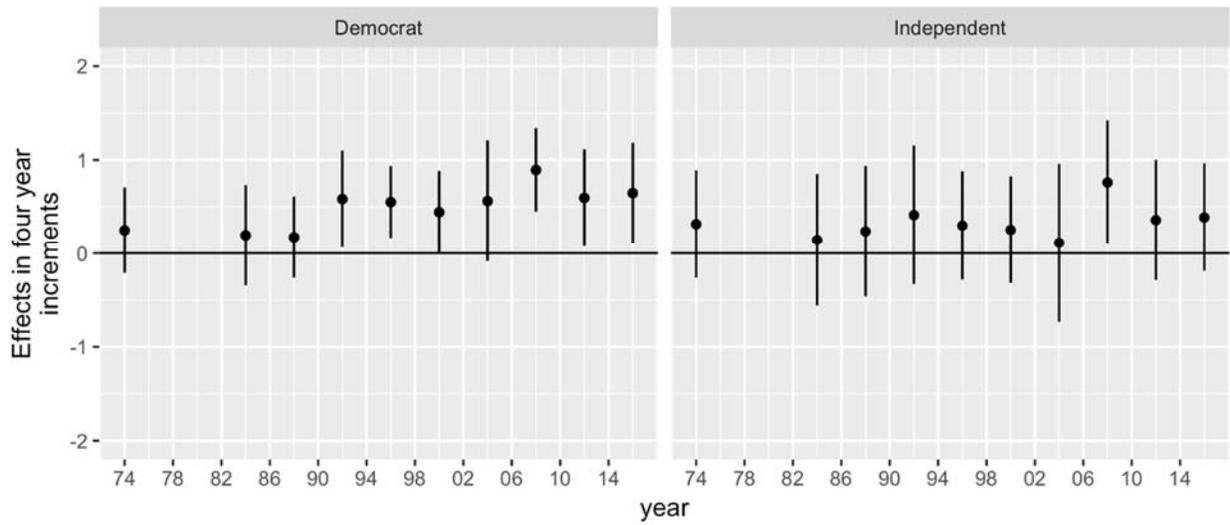


Figure 6: Partial effects of political partisanship on marijuana legalization using logistic regression on data from the General Social Survey, 1974-2016

Note: The reference group is Republicans. Controls for education, age, birth nation (US versus other), gender, race/ethnicity, religious identity and service attendance included. Vertical lines represent 95% confidence intervals.

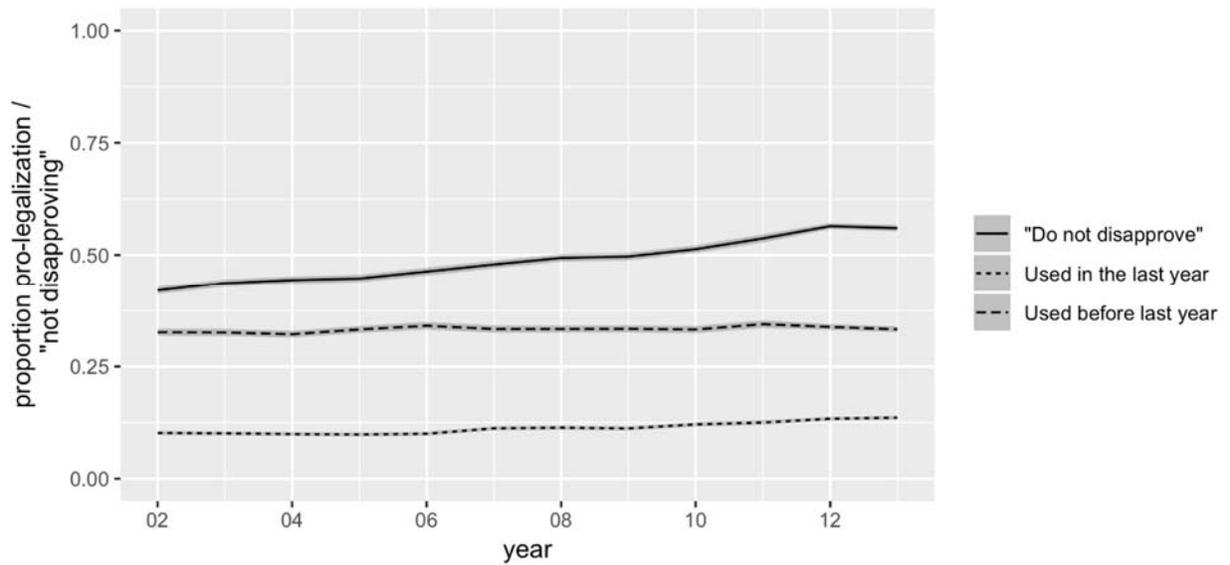


Figure 7: Trends in attitudes about marijuana and usage rates among persons 18 years and older using the National Survey of Drug Use and Health, 2002 - 2015

Note: Shaded regions indicate 95% confidence intervals.

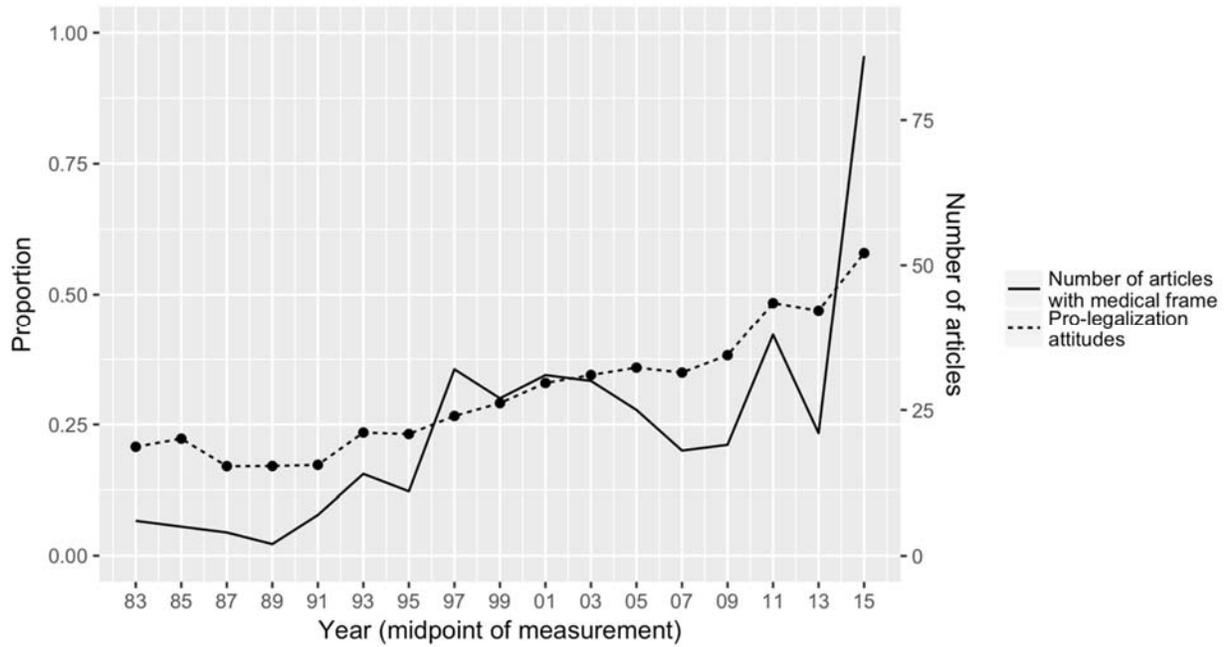


Figure 8: Trend in pro-legalization attitudes and the proportion of articles in the *New York Times* about marijuana that use a medical frame, 1983-2015

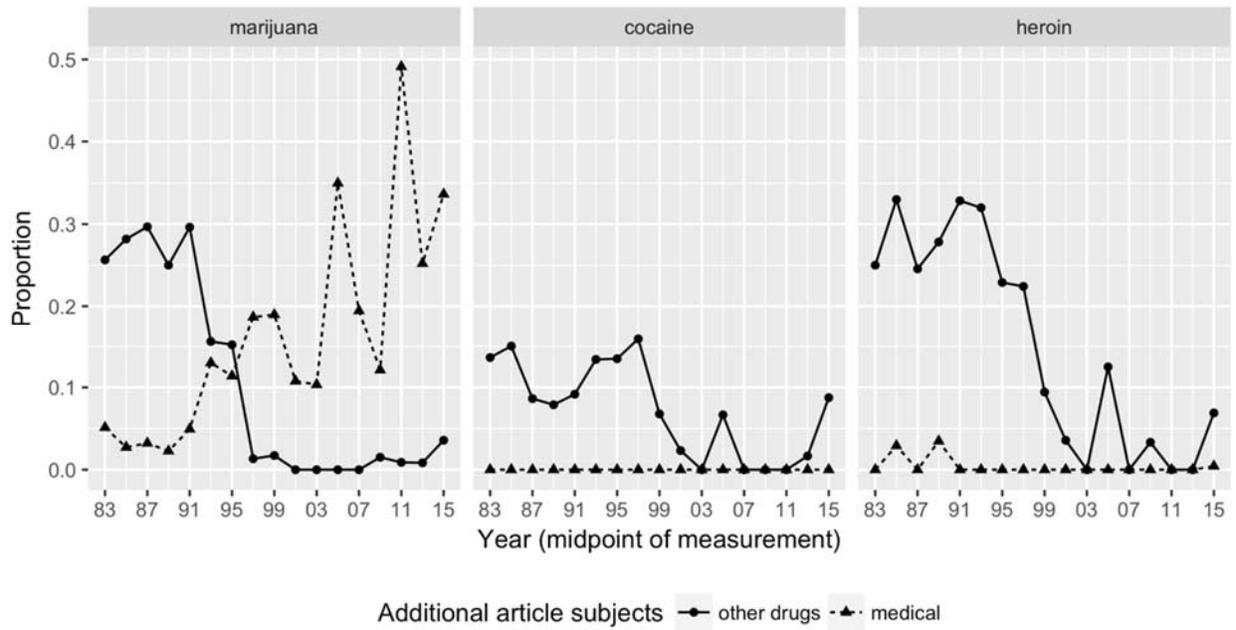


Figure 9: Proportion of *New York Times* articles that use a medical frame and associations with other drugs for marijuana, cocaine, and heroin, 1983-2015

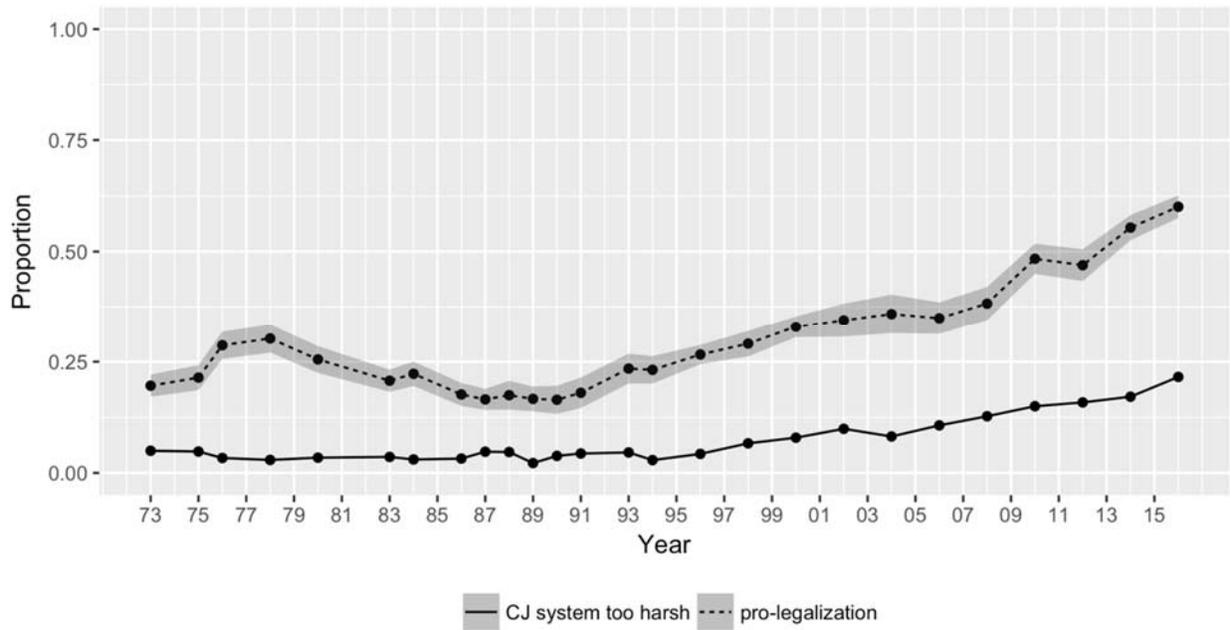


Figure 10: Trends in pro-legalization attitudes and attitudes about whether the Criminal Justice (CJ) system is too harsh using the General Social Survey, 1973-2016