Published in final edited form as:

Prev Sci. 2014 October ; 15(5): 725–735. doi:10.1007/s11121-013-0436-0.

Predictors of Disapproval toward “Hard Drug” Use among High School Seniors in the US

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Abstract

Attitudes toward drug use strongly determine whether an individual initiates use. Personal disapproval toward the use of a particular drug is strongly protective against use; however, little is known regarding how the use of one drug affects attitudes toward the use of other drugs. Since marijuana use is on the rise in the US and disapproval toward use is decreasing, research is needed to determine whether the use of marijuana or other licit or illicit drugs reduces disapproval toward the use of “harder,” more potentially dangerous drugs. The Monitoring the Future study assesses a national representative sample of high school seniors in the US each year. This study investigated predictors of disapproval toward the use of powder cocaine, crack, lysergic acid diethylamide (LSD), heroin, amphetamine, and ecstasy (“Molly”) in a weighted sample of 29,054 students from five cohorts (2007–2011). Results suggest that lifetime use of cigarettes and use of more than one hard drug consistently lowered odds of disapproval. In multivariable models, lifetime alcohol use did not affect odds of disapproval and lifetime marijuana use (without the use of any “harder” drugs) lowered odds of disapproval of LSD, amphetamine, and ecstasy, but not cocaine, crack, or heroin. In conclusion, marijuana use within itself is not a consistent risk factor for lower disapproval toward the use of harder drugs. Cigarette and hard drug use, however, are more consistent risk factors. As marijuana prevalence increases and policy becomes more lenient toward recreational and medicinal use, public health and policy experts need to ensure that attitudinal-related risk does not increase for the use of other drugs.

Keywords

Adolescents; Social norms; Attitudes; Risk factors; Illicit drug use; Marijuana

Introduction

Illicit drug use has become increasingly prevalent among adolescents in the US, with half (49.9 %) of high school seniors reporting the use of an illicit drug in their lifetime (Johnston et al. 2012a). In 2011, lifetime marijuana use (aka lifetime prevalence) among high school seniors rose to 45.5 %, and this increase may be attributed, in part, to changing attitudes toward the use of this substance. While it is well known that personal disapproval toward

drug use is a robust protective factor against use (Bachman et al. 1990, 1998; Keyes et al. 2011), research is needed to examine whether marijuana use or the use of other drugs alters attitudes toward the use of “harder,” more potentially dangerous illicit drugs.

According to Monitoring the Future (MTF), a nationally representative annual high school survey, disapproval toward the use of marijuana among seniors has slowly decreased over recent years (Johnston et al. 2012a). Favor for complete legalization among seniors has also reached an all time high of 39 %, with another 27 % favoring marijuana offences being treated as minor violations and not crimes (Johnston et al. 2012a). Likewise, favor for marijuana legalization is at an all time high among adults (52 %; Pew Research Center 2013). Coinciding with public opinion, medical marijuana is now legal in 18 states, and in November of 2012, two states legalized recreational use. Since the US is experiencing a drastic change in attitudes toward marijuana and associated policy, rates of use may continue to increase. Although marijuana tends to be less dangerous than “harder” illicit drugs such as cocaine and heroin (Gable 2004; Morgan et al. 2010; Nutt et al. 2007, 2010), it is important to prevent or delay the onset of the use of other drugs that are more likely to be initiated after marijuana (Kandel et al. 1992; Kandel and Yamaguchi 1993). Thus, research is needed to examine how the use of marijuana is associated with attitudes toward the use of other drugs.

There are numerous social determinants and predictors of recreational drug use; however, attitudes toward use as protective factors are relatively understudied phenomena. Research has confirmed that approval of use may increase intentions to use, but analyses tend to focus on licit drugs and marijuana as drug use outcomes (Kam et al. 2009; Malmberg et al. 2012; Stephens et al. 2009). Large-scale studies also report consistent and robust associations between personal disapproval toward use and lifetime use. Specifically, disapproval toward the use of drugs such as marijuana and cocaine is a strong protective factor against the use of these drugs (Bachman et al. 1990, 1998). Recent literature further indicates that disapproval by peers in one’s birth cohort is a robust factor predicting use, over and above individual attitudes (Keyes et al. 2011, 2012). However, few studies have examined “hard” drug use or these associations in the reverse direction—with drug use explaining attitudes toward use (de Leeuw et al. 2008; Palamar et al. 2012a). Little is known about how personal disapproval toward the use of one illicit drug is altered by the use of other illicit drugs. For example, while disapproval toward the use of cocaine is protective against cocaine use (Bachman et al. 1990), little is known about whether the use of marijuana decreases disapproval toward the use of cocaine or other “harder” drugs. Findings from a recent examination of personal stigmatization toward drug users suggest that marijuana users not only stigmatize other marijuana users at lower levels but also stigmatize users of harder drugs such as powder cocaine, ecstasy (“Molly”), opioids, and amphetamine at lower levels (Palamar et al. 2012a). A large-scale study of a similar concept—disapproval—will help determine whether the use of marijuana or other drugs is further associated with higher attitudinal-related risk for the use of harder drugs. This information is important to inform prevention science and drug policy because increasing rates of marijuana use may indirectly place users at risk for the use of “harder” drugs. A greater understanding of how marijuana use correlates with disapproval toward various illicit drugs will allow us to more effectively tailor prevention efforts.

This study utilizes 2007–2011 MTF data in order to (1) examine how demographic characteristics and lifetime use of various drugs explain disapproval toward the use of select “hard” drugs and, more specifically, to (2) delineate how lifetime marijuana use predicts disapproval toward the use of these drugs.

Methods

Study Design

MTF is an annual cross-sectional survey of high school seniors in approximately 130 public and private schools throughout 48 states in the US (Johnston et al. 2012a). Schools are selected through a multistage random sampling procedure: geographic areas are selected, then schools within areas are selected, and then, finally, students within schools are selected. Roughly 15,000 high school seniors have been assessed annually since 1975. Since MTF assesses a variety of constructs, content is divided into six questionnaire forms, which are distributed randomly. Therefore, in some respects, MTF assesses six random subsamples, each using a different survey form. All forms assess demographics and lifetime use of a variety of drugs, but only four forms assess disapproval toward the use of various drugs. This analysis focuses on students with complete demographic and drug use data who were also assessed with at least one disapproval item (described in the succeeding sections). Data from five cohorts (years 2007–2011) were pooled and the analytic (weighted) sample of students with complete data was $N=29,054$. Data were weighted to adjust for differential probability of selection of schools and students.

Sample

Sample demographics, lifetime drug use, and disapproval rates are presented in Table 1. The majority of the sample identified as White (67.6 %) and at least 18 years of age (57.7 %). On average, students were moderately religious and the mean level of parent education was some college. Nearly three quarters of students used alcohol in their lifetime and lifetime prevalence of cigarette use and marijuana use were nearly identical. Use of heroin and crack were most disapproved by students and lysergic acid diethylamide (LSD) and amphetamine were least disapproved.

Measures

Outcome Variables—Students were asked whether they disapprove of people (who are 18 years or older) trying various drugs once or twice. Answer options were (1) “don’t disapprove,” (2) “disapprove,” and (3) “strongly disapprove,” and these were collapsed into dichotomous variables: 0—“don’t disapprove” and 1—“disapprove.” MTF assessed disapproval toward the use of various drugs, but not all students were assessed for disapproval toward the use of the same drugs. This analysis examined disapproval toward the use of the following drugs: powder cocaine (forms 1 and 2), crack (forms 1 and 2), LSD (form 3), heroin (form 3), amphetamine (form 3), and ecstasy (form 6).

Predictors of Drug Disapproval—MTF assessed student demographics including student age, sex, and race (i.e., White, Black, Hispanic). Parent educational attainment was assessed for both parents via an ordinal item. A mean parent education composite was

calculated for both parents (or raw score if only one parent) and it was then coded into three groups: (1) low (1.0–3.0), moderate (3.5–4.0), and high education (4.5–6.0). Parent education was used to serve as a proxy for family socioeconomic status (SES) (Wallace et al. 2009). Religious attendance and importance were also assessed via two ordinal items. These items were computed into a mean religiosity composite (range, 1–4) and split into tertiles indicating low (1.0–2.0), moderate (2.5–3.0), and high (3.5–4.0) religiosity. MTF also assessed population density where each student resides (i.e., nonmetropolitan statistical area [non-MSA], small MSA, or large MSA). Lifetime use of alcohol (“more than just a few sips”), cigarettes, and marijuana (including hashish) were assessed, and since lifetime marijuana use was the main predictor in this study and was moderately to strongly correlated with lifetime use of alcohol, cigarettes, and hard drugs, a new variable was calculated to indicate lifetime use of marijuana, but not any hard drugs. MTF also assessed lifetime use of “harder” drugs: cocaine, crack, LSD, hallucinogens other than LSD, heroin, and nonmedical use of narcotics (other than heroin), tranquilizers (e.g., benzodiazepines), sedatives (e.g., barbiturates) and amphetamine. Ecstasy could not be included as it was only assessed through two of six forms.

Data Analyses

Design-based binary logistic regression models (Heeringa et al. 2010) were computed using PROC SURVEYLOGISTIC with sampling weights in SAS 9.3 (SAS Institute, Inc., Cary, NC, US), accounting for MTF’s complex multistage sampling design. First, unadjusted odds ratios (ORs) were calculated to examine how lifetime use of various drugs (or lifetime drug “combinations”) predicted disapproval toward each drug. Specifically, the following eight predictors were examined: (1) alcohol, (2) cigarettes, (3) alcohol and cigarettes, (4) marijuana, (5) alcohol, cigarettes, and marijuana, (6) any hard drug(s), (7) marijuana and hard drug(s), and (8) alcohol, cigarettes, marijuana, and hard drug(s). Phi coefficients (ϕ), which are analogous to correlations (Jeckel et al. 2007), were also calculated to determine levels of association between these dichotomous variables to make results more comparable.

Next, potential correlates of disapproval to be modeled were examined. Unadjusted ORs were first calculated to determine associations between each variable and disapproval toward the use of each drug. Then, all covariates (regardless of significance) were fit simultaneously in multivariable models to examine associations with all else equal, producing adjusted ORs (AORs). Potential cohort (year of survey administration) effects were carefully controlled by entering indicators for each year (with 2007 as the comparison) into both unadjusted and adjusted models because rates of use and disapproval vary over time (Johnston et al. 2012a; Wray-Lake et al. 2012). Models had good fit (e.g., as per Hosmer–Lemeshow tests) and high correct classification rates. The outcome variables (disapproval of each drug), however, were strongly intercorrelated; specifically, cocaine and crack ($\phi=0.80$), LSD and heroin ($\phi=0.54$), LSD and amphetamine ($\phi=0.58$), and heroin and amphetamine ($\phi=0.54$, all $ps<0.001$) disapproval outcomes were all highly interrelated. Therefore, to reduce the lack of independence between outcomes, 99 % confidence intervals (CIs) with a more conservative alpha of 0.01 were applied. The conservative alpha was also used to reduce type I error that can result from large sample size and to further account for clustering of students within schools (Keyes et al. 2011; Ilgen et al. 2011).

It should be noted that lifetime use of each of the nine “harder” drugs tended to be moderately to highly interrelated ($\phi=0.20\text{--}0.56$, all $ps<0.001$). Most students who used marijuana had also used alcohol (95 %) or cigarettes (75 %), and most students who smoked cigarettes had also used alcohol (94 %). Likewise, most hard drug users had also used alcohol (94 %), cigarettes (77 %), or marijuana (81 %). Therefore, to prevent multicollinearity, models were carefully fit using an indicator representing the use of marijuana, but not any hard drugs, and instead of fitting each hard drug indicator individually ($n=9$), two indicators were created and entered: one for the use of only one hard drug and the other for the use of multiple hard drugs (two to nine drugs). The final set of variables reduced interrelations between predictors; for example, the correlation between marijuana use and cigarette use was $\phi=0.55$, but the association was reduced to $\phi=0.24$ when replacing marijuana use with the variable indicating marijuana use, but no hard drug use. The reduction of these interrelations prevented multicollinearity and also allowed better fit.

Results

Alcohol was often only weakly associated with disapproval across drugs (Table 2). Cigarette use was more strongly associated with lower odds of disapproval, and marijuana use had comparable associations with the use of cigarettes and alcohol. Marijuana associations were strongest when other drugs were used. In general, the more drugs used, the lower the odds of disapproval, and hard drug use (alone or in combination) most strongly decreased the odds of disapproval. Disapproval toward LSD and amphetamine use was consistently reduced by the use of any drug, and disapproval toward crack and heroin use was affected least by the use of any drug.

Next, multiple demographic and drug use covariates were modeled. With respect to disapproval toward the use of powder cocaine (Table 3), identifying as a female, as highly religious, or as a marijuana user (but not a hard drug user) was associated with increased odds (OR=1.37, 99 % CI=1.12–1.69, $p<0.0001$) of disapproval, and cigarette, alcohol, and multiple hard drug use decreased the odds of disapproval in unadjusted models. In the adjusted model, however, both alcohol use and marijuana use (AOR=1.05, 99 % CI=0.80–1.38) lost significance. In the adjusted model, moderate religiosity increased the odds of disapproval and identifying as Black and use of only one hard drug decreased the odds of disapproval. Regarding crack disapproval (Table 3), identifying as female or highly religious increased the odds of disapproval toward crack use, and use of alcohol, cigarettes, or multiple hard drugs reduced the odds of disapproval in unadjusted models. In the adjusted model, however, the significance of alcohol disappeared and marijuana use remained nonsignificant (AOR=1.20, 99 % CI=0.88–1.62). In the adjusted model, moderate religiosity increased the odds of disapproval, identifying as Black decreased the odds of disapproval, and use of only one hard drug was not associated.

With regard to LSD disapproval (Table 4), identifying as female, Black, or religious increased the odds of disapproval, and high parent education and alcohol, cigarette, and hard drug use decreased the odds of disapproval. In the adjusted model, identifying as Black and alcohol use lost significance, and marijuana use (AOR=0.58, 99 % CI=0.40–0.84, $p<0.001$)

decreased the odds for LSD disapproval. The odds of heroin disapproval (Table 4) were increased by identifying as a female or highly religious, and those who used alcohol, cigarettes, or multiple hard drugs were at lower odds of disapproval. However, in the adjusted model, the significance of sex (female) and alcohol use disappeared, and moderate religiosity increased the odds of disapproval. Marijuana (AOR=1.00, 99 % CI=0.59–1.70) and use of a single hard drug were not significant.

The odds of amphetamine disapproval (Table 5) were increased by identifying as Black, as a female, as highly religious, or as a marijuana user (without the use of hard drugs) (OR=1.40, 99 % CI=1.08–1.82, $p<0.001$), and use of alcohol, cigarettes, or hard drugs lowered the odds of disapproval. In the adjusted model, however, the significance of identifying as Black or female was lost, as was the association for alcohol use, and high parent education, residing in a small MSA, and marijuana use lowered the odds of disapproval (AOR=0.60, 99 % CI=0.41–0.88, $p<0.001$). Finally, the odds for ecstasy disapproval (Table 5) were increased by identifying as female or highly religious, and odds were reduced in those who resided in a small MSA, identified as Hispanic, or used alcohol, cigarettes, or hard drugs in their lifetime. In the adjusted model, significance of identifying as Hispanic and alcohol use was lost, and moderate religiosity increased the odds of disapproval. Identifying as Black, high parent education, and marijuana use (AOR=0.62, 99 % CI= 0.44–0.87, $p<0.001$) significantly decreased the odds of disapproval.

Discussion

Marijuana use is on the rise in the US, and attitudes are shifting with fewer individuals disapproving of its use (Johnston et al. 2012a). Marijuana use may increase the likelihood of the use of “harder” drugs (Kandel et al. 1992; Kandel and Yamaguchi 1993), and this may result, in part, from less negative attitudes toward use after a drug has been initiated (Best et al. 2000). This study was needed to determine whether lifetime use of marijuana reduces disapproval toward the use of other drugs. Seminal studies have examined how disapproval explains use (Bachman et al. 1990, 1998; Keyes et al. 2011), but this study examined how the use of one drug (e.g., marijuana) predicted disapproval toward the use of other drugs.

There were numerous predictors of disapproval toward the use of different drugs. With respect to demographic characteristics, identifying as female was a consistent, robust factor increasing the odds of disapproval toward the use of cocaine, crack, LSD, and ecstasy. This was not unexpected as females are less likely to use most drugs, compared to males (Degenhardt et al. 2007; Herman-Stahl et al. 2007; Johnston et al. 2012b). There were no age associations, but the reader should be reminded that there was little variation in age. Age likely has more of an effect throughout young adulthood as older young adults tend to report fluctuating levels of disapproval (Johnston et al. 2012c; Palamar et al. 2012a). Religiosity has been shown to reduce the odds of use of various drugs (Degenhardt et al. 2007; Herman-Stahl et al. 2007; Palamar et al. 2012b), but little was known about how this construct relates to attitudes toward use. Findings suggest that religiosity consistently and robustly increased the odds of disapproval toward the use of all drugs. This was also expected as religiosity is positively associated with disapproval and stigma toward users of various drugs (Bachman et

al. 1998; Palamar et al. 2011), likely because religion is a major force in societal values (Gilmore and Somerville 1994).

With regard to high SES, as indicated by high parent education, results suggest that it decreased the odds of disapproval toward the use of LSD, amphetamine, and ecstasy. Residing in a small MSA (vs. non-MSA) was also associated with lower odds of disapproval of amphetamine and ecstasy. Thus, it appears that those of higher SES and those who reside in more urban areas are more likely to disapprove less of these three drugs that are “less dangerous” than cocaine, crack, and heroin (Gable 2004; Morgan et al. 2010; Nutt et al. 2007, 2010). Likewise, the use of many illicit drugs tends to be more prevalent in urban areas (Johnston et al. 2012b) and, therefore, the use of some drugs may be more normalized in cities, leading to lower disapproval. With regard to race, however, identifying as Black decreased the odds of disapproval of the use of powder cocaine, crack, and ecstasy. This finding is somewhat paradoxical because disapproval toward use tends to be protective against use among subgroups (e.g., females, religious), but Black students report low disapproval toward these drugs and yet still use at lower rates than White students (Johnston et al. 2012b). It is possible that low disapproval coupled with low rates of use can be explained, in part, by high rates of arrest and incarceration among Blacks (Golub et al. 2007), which may act as somewhat of a deterrent for minorities. Blacks also tend to be more religious than other races, so they may be more protected against use despite attitudes toward use (Palamar et al. 2012b, 2013). Lower disapproval toward ecstasy use may also be related to the recent normalization of ecstasy (aka molly) use in rap and hip hop music lyrics (Aleksander 2013). Further research regarding race associations is warranted.

There was a high level of interrelation between all drugs and multivariable models helped disentangle the associations between use and disapproval. In unadjusted models, alcohol and cigarette use decreased the odds of disapproval toward the use of all drugs. However, in adjusted models, alcohol lost significance, but cigarette use robustly and consistently reduced odds of disapproval toward the use of all drugs. Cigarette prevalence has decreased in recent years; it is now becoming less prevalent than marijuana, and disapproval and stigma toward cigarette use has increased, surpassing marijuana, suggesting possible denormalization (Bayer and Stuber 2006; Johnston et al. 2012a). As cigarette use becomes less prevalent and more stigmatized, the lack of social desirability associated with use may alter users’ attitudes and lower disapproval toward other drugs, possibly more so than alcohol or marijuana.

Marijuana use, a main focus of this study, decreased the odds of disapproval toward the use of the same three drugs that were also negatively associated with SES and MSA—LSD, amphetamine, and ecstasy—but not the other three “harder” drugs. Bivariable analyses confirmed that marijuana use does decrease the odds of disapproval toward the use of some drugs, but when examining those who used marijuana, but who had never used a hard drug, marijuana was only a risk factor for lower disapproval toward the use of LSD, amphetamine, and ecstasy. Bivariable findings suggest that marijuana use was weakly–negatively associated with disapproval toward the use of each drug, but use did not become a moderate risk factor unless a hard drug was also used. Similarly, in a national study of adolescent drug use, those who used both marijuana and ecstasy reported lower disapproval toward ecstasy

than those who only used marijuana (Martins et al. 2008). This current study was unique in that models were constructed to disentangle confounding between marijuana use and hard drug use.

Use of multiple hard drugs robustly and consistently reduced odds of disapproval; however, use of only one hard drug only reduced the odds of disapproval toward drugs other than crack and heroin. This finding corroborates previous findings in that even users of “hard” drugs (e.g., amphetamine, cocaine, ecstasy) often still disapprove of the use of crack and heroin as they view them as being substantially “harder,” addicting, and non-recreational (McElrath and McEvoy 2001; Williams and Parker 2001). With respect to level of harm users may experience from use, experts and users alike tend to agree that heroin and crack (followed by powder cocaine) are the most dangerous illicit drugs and that LSD and ecstasy tend to be associated with a lower likelihood of harm (Gable 2004; Morgan et al. 2010; Nutt et al. 2007, 2010).

Marijuana use consistently predicted lower disapproval toward the use of LSD, amphetamine, and ecstasy, possibly because these three drugs are more “socially acceptable” than powder cocaine, crack, and heroin. Marijuana users may be less likely to disapprove of LSD and ecstasy use because, like marijuana, both drugs induce perceptual changes and altered state of consciousness (Grof 2008; Ramtekkar et al. 2011). Amphetamine, compared to some other drugs, may be more easily accessible (and, thus, familiar) as it is prescribed. Most amphetamine misuse is through diversion of prescription drugs (Kroutil et al. 2006) and many high school students are asked by other students to give, sell, or trade their medication (McCabe et al. 2004); therefore, many students are likely familiar with recreational use. In addition, historically, misuse of stimulants, such as amphetamine, tends to be less stigmatized than other “hard” drugs as it is often used to improve endurance or mental functioning (e.g., for studying) (Grinspoon 1976). While cocaine use has often been associated with a perceived sense of glamour as many famous and wealthy individuals use it (Ditton et al. 1991; Musto 1999), overall, use is still strongly stigmatized by most individuals. Finally, as aforementioned, users and nonusers alike tend to disapprove of the use of crack and heroin. This may be due to the route of administration or perceived danger. With the exception of marijuana, smoking or injecting drugs (e.g., crack, heroin) tends to be highly stigmatized often because individuals associate use with low-income neighborhoods and addiction (Fuller et al. 2005; Gossop et al. 1994).

Research suggests that disapproval toward use is protective for the potential user, and more recent evidence suggests that there are also robust associations in which level of disapproval by one’s birth cohort more strongly predicts the likelihood of use (Keyes et al. 2011). However, with respect to a similar, but harsher concept—stigmatization, a recent study found that stigmatizing users was also a robust protective factor against use, but perception of public stigma toward use was less effective as a protective factor (Palamar et al. 2011, 2013). Although disapproval is not as extreme as stigmatization, policy experts need to keep in mind that, while personal disapproval is “self-protective,” such attitudes may not necessarily deter others from use. Perception of negative attitudes toward use has been found to be associated with secrecy, feelings of rejection, and depression among those who reject abstinence (Latkin et al. 2012; Palamar 2012). Stigma is also a major barrier to addicts

receiving treatment (Radcliffe and Stevens 2008) and it interferes with honest reporting in studies (Percy et al. 2005). Therefore, nonjudgmental educational information may be beneficial in preventing use as well as stigmatizing attitudes toward those who reject abstinence and may need treatment.

Limitations and Recommendations for Future Studies

While MTF is a national representative sample, disapproval measures were only collected in four of six subsamples, so the full sample could not be utilized. Disapproval of different drugs was assessed in separate subsamples, so the full sample is actually the total of three mutually exclusive subsamples. To examine the validity of the findings by cohort, multivariable models were also stratified by year, and the results across cohorts were reasonably consistent. Missing data were also an issue; however, missing data indicators for race were entered into models to maximize sample size and help reduce bias.

Indicators for each hard drug could not be fit into models without creating multicollinearity, so indicators of use (e.g., use of one drug, use of multiple drugs) were fit instead. Specific hard drugs do predict disapproval differently; for example, use of a drug predicts lower disapproval of the same drug, over and above other drugs (Palamar et al. 2012a), and subanalyses (not presented) in this study confirmed this. However, the use of each hard drug was negatively associated with disapproval in a somewhat similar manner, so the recoded indicators were fit into the final models and yielded consistent results. Finally, causality should not be inferred as this study was cross-sectional. Covariates are referred to as predictors in this study as reported drug use would have preceded disapproval reported during the survey.

Longitudinal studies are not only needed to assess temporal associations between use and disapproval of the same drugs, but they are also needed to assess how use and disapproval of one drug affect the use and disapproval of other drugs. In addition, exposure to users is a strong predictor of use and disapproval toward use (Palamar et al. 2011; Palamar et al. 2012a), so longitudinal research also needs to consider how such contact with users influences use and attitudes over time. Research is also needed to assess how witnessing negative drug-related outcomes is associated with disapproval. Finally, more studies are needed to examine how attitudes relate to outcomes resulting from use. Use within itself is often considered a negative outcome in an epidemiological sense, but as public health specialists, we also need to investigate and prevent adverse outcomes associated with use.

Conclusion

Marijuana use and support for legalization is on the rise, and disapproval toward use continues to decrease (Johnston et al. 2012a). Some states in the US have enacted more liberal marijuana laws, and this will likely further reduce stigma and disapproval (Caulkins et al. 2012; Cerdá et al. 2012), which may indirectly increase the odds of use of other drugs. Prevention scientists can use these results to inform prevention efforts in this time of increasing marijuana use and acceptance toward use. While marijuana use within itself does not appear to be a large risk factor for use of “harder” drugs, this study found that multidrug use (using numerous drugs—licit or illicit—in one’s lifetime) is among the largest risk

factors as it is associated with lower disapproval toward use. While it may be difficult to prevent an adolescent or young adult from using alcohol, tobacco, or marijuana, results suggest that we need to prevent individuals from becoming users of multiple drugs (licit or illicit). Also, once an individual initiates use of a “harder” drug, he or she tends to disapprove of the use of other illicit drugs at lower levels. This suggests that our drug laws, drug subculture, black markets, and drug education may tie many illicit drugs together, and after the use of one of these drugs, a user may identify himself or herself as an illicit drug user (Palamar et al. 2012a). So, we not only need to focus on the prevention of the use of any of these “harder” illicit drugs, but we must also find a way to stop grouping all illicit drugs in the same category as they each have different effects and varying levels of danger (Nutt et al. 2007).

Marijuana use is a risk factor for the use of various other drugs as it is associated with lower disapproval toward use, so public health efforts need to ensure that use does not increase willingness to use “harder” drugs. While it is unknown whether more liberal state marijuana policies are associated with increases in use, policy shifts might actually separate marijuana from illicit drug markets, removing users from the realm of “illegal” behavior. It is unknown whether changing attitudes toward use will affect the use of more dangerous drugs in light of changing policy. The separation of marijuana from other drugs may actually prevent lowered disapproval toward other drugs in the future. As policy and trends in attitudes continue to shift, it is important to continue to monitor such associations. Regardless, we must keep in mind that personal disapproval toward the use of a drug may prevent oneself from use, but disapproval toward others’ use may exacerbate the adverse outcomes they may experience if they reject abstinence. Drug use is unique in that we tend to focus on maintaining negative attitudes toward users as a prevention method, but this method is not used to prevent other risky or unhealthy behaviors (e.g., unsafe sex, overeating). Disapproval toward drug use is generally protective to the individual who holds this attitude, but the public’s health would likely benefit the most from a paradigm that treats drug use as more of a health behavior and less of a moral behavior that needs to be “disapproved.”

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Table 1Demographics, drug use, and drug disapproval (weighted $N=29,054$)

	Percentage
Age	
<18 years	42.3
18 years	57.7
Sex	
Male	47.4
Female	52.6
Race	
White	67.6
Black	12.1
Hispanic	10.1
Missing	10.2
Population density	
Non-MSA	24.7
Small MSA	48.2
Large MSA	27.1
Parent educational attainment	
Low	29.9
Moderate	29.7
High	40.4
Religiosity	
Low	40.0
Moderate	28.9
High	31.0
Lifetime drug use	
Alcohol	73.2
Cigarettes	43.0
Any illicit drug	46.5
Marijuana	42.1
Marijuana, but no hard drug(s)	23.3
Any hard drug	23.2
One hard drug	9.8
Multiple (2–9) hard drugs	13.4
Total hard drugs used, $M(SD)$	0.60 (1.43)
Drug disapproval	
Cocaine	88.2
Crack	91.1
LSD	86.9
Heroin	94.9
Amphetamine	87.0

	Percentage
Ecstasy	88.2

All cases had complete data other than race ($n=2,958$)

Table 2

Unadjusted drug use predictors of disapproval

Lifetime use	Disapproval	OR	99 % CI	Phi
Alcohol	Cocaine	0.44	(0.35–0.56)	–0.10
	Crack	0.63	(0.50–0.80)	–0.05
	LSD	0.32	(0.24–0.44)	–0.13
	Heroin	0.63	(0.43–0.94)	–0.04
	Amphetamine	0.34	(0.25–0.46)	–0.13
	Ecstasy	0.38	(0.28–0.51)	–0.12
Cigarettes	Cocaine	0.34	(0.28–0.40)	–0.17
	Crack	0.50	(0.41–0.61)	–0.10
	LSD	0.26	(0.21–0.32)	–0.22
	Heroin	0.35	(0.25–0.48)	–0.11
	Amphetamine	0.29	(0.23–0.36)	–0.20
	Ecstasy	0.29	(0.23–0.36)	–0.20
Alcohol and cigarettes	Cocaine	0.33	(0.29–0.40)	–0.18
	Crack	0.51	(0.42–0.62)	–0.10
	LSD	0.26	(0.21–0.33)	–0.22
	Heroin	0.37	(0.27–0.52)	–0.11
	Amphetamine	0.29	(0.23–0.36)	–0.21
	Ecstasy	0.28	(0.22–0.35)	–0.20
Marijuana	Cocaine	0.34	(0.28–0.40)	–0.18
	Crack	0.55	(0.46–0.67)	–0.08
	LSD	0.19	(0.15–0.24)	–0.26
	Heroin	0.40	(0.29–0.56)	–0.10
	Amphetamine	0.23	(0.18–0.29)	–0.24
	Ecstasy	0.22	(0.17–0.28)	–0.23
Alcohol, cigarettes and marijuana	Cocaine	0.29	(0.25–0.35)	–0.20
	Crack	0.50	(0.41–0.60)	–0.10
	LSD	0.21	(0.17–0.27)	–0.26
	Heroin	0.36	(0.27–0.50)	–0.12
	Amphetamine	0.24	(0.19–0.30)	–0.24
	Ecstasy	0.23	(0.19–0.29)	–0.24
Any hard drug(s)	Cocaine	0.23	(0.19–0.27)	–0.24
	Crack	0.40	(0.33–0.49)	–0.13
	LSD	0.17	(0.14–0.21)	–0.31
	Heroin	0.34	(0.25–0.47)	–0.12
	Amphetamine	0.15	(0.12–0.19)	–0.33
	Ecstasy	0.18	(0.15–0.22)	–0.29
Marijuana and hard drug(s)	Cocaine	0.19	(0.16–0.23)	–0.27
	Crack	0.36	(0.30–0.44)	–0.14
	LSD	0.14	(0.11–0.17)	–0.34

Lifetime use	Disapproval	OR	99 % CI	Phi
Alcohol, cigarettes, marijuana and hard drug(s)	Heroin	0.29	(0.22–0.40)	–0.14
	Amphetamine	0.14	(0.11–0.18)	–0.34
	Ecstasy	0.16	(0.13–0.20)	–0.31
	Cocaine	0.18	(0.15–0.21)	–0.28
	Crack	0.35	(0.28–0.43)	–0.14
	LSD	0.14	(0.12–0.18)	–0.33
	Heroin	0.28	(0.21–0.39)	–0.14
	Amphetamine	0.14	(0.12–0.18)	–0.33
	Ecstasy	0.17	(0.14–0.21)	–0.29

All ORs and phi coefficients are $p < 0.001$. ORs were unadjusted. Phi coefficients represent correlations between two dichotomous variables, and associations/effects in either direction can be weak (0.10–0.29), moderate (0.30–0.49), or strong (0.50–0.70).

Table 3

Predictors of disapproval toward the use of powder cocaine and crack

	Powder cocaine disapproval (N = 13,195)				Crack disapproval (N = 13,169)			
	OR	99 % CI	AOR	99 % CI	OR	99 % CI	AOR	99 % CI
Age <18	1.00		1.00		1.00		1.00	
Age 18	0.98	(0.83–1.16)	0.99	(0.83–1.18)	1.07	(0.88–1.30)	1.09	(0.89–1.32)
Male	1.00		1.00		1.00		1.00	
Female	1.48	(1.26–1.75) ***	1.42	(1.19–1.69) ***	1.42	(1.17–1.72) ***	1.38	(1.13–1.68) ***
White	1.00		1.00		1.00		1.00	
Black	1.05	(0.81–1.37)	0.56	(0.41–0.75) ***	0.78	(0.59–1.03)	0.50	(0.37–0.68) ***
Hispanic	1.02	(0.77–1.35)	0.84	(0.62–1.14)	0.93	(0.68–1.27)	0.79	(0.57–1.10)
Non-MSA	1.00		1.00		1.00		1.00	
Small MSA	1.03	(0.87–1.21)	0.99	(0.80–1.24)	1.00	(0.83–1.21)	1.03	(0.80–1.31)
Large MSA	0.91	(0.76–1.09)	0.91	(0.71–1.17)	1.00	(0.81–1.24)	1.05	(0.80–1.38)
Low parent education	1.00		1.00		1.00		1.00	
Moderate parent education	1.03	(0.86–1.23)	1.03	(0.82–1.29)	1.06	(0.86–1.31)	1.17	(0.92–1.50)
High parent education	1.01	(0.85–1.19)	0.92	(0.75–1.14)	1.14	(0.94–1.39)	1.12	(0.89–1.42)
Low religiosity	1.00		1.00		1.00		1.00	
Moderate religiosity	1.09	(0.91–1.31)	1.51	(1.23–1.85) ***	1.04	(0.84–1.28)	1.39	(1.11–1.75) **
High religiosity	2.38	(1.93–2.94) ***	2.13	(1.67–2.71) ***	1.93	(1.53–2.44) ***	1.92	(1.46–2.52) ***
No lifetime alcohol use	1.00		1.00		1.00		1.00	
Lifetime alcohol use	0.45	(0.36–0.56) ***	0.92	(0.70–1.21)	0.64	(0.50–0.81) ***	0.95	(0.71–1.26)
No lifetime cigarette use	1.00		1.00		1.00		1.00	
Lifetime cigarette use	0.34	(0.29–0.40) ***	0.58	(0.47–0.72) ***	0.51	(0.52–0.61) ***	0.68	(0.53–0.87) ***
No lifetime illicit drug use	1.00		1.00		1.00		1.00	
Lifetime marijuana use, but no hard drug use	1.37	(1.12–1.69) ***	1.05	(0.80–1.38)	1.26	(0.99–1.59)	1.20	(0.88–1.62)
Used one hard drug	0.79	(0.62–1.02)	0.62	(0.46–0.84) ***	0.90	(0.66–1.21)	0.84	(0.59–1.19)
Used multiple hard drugs	0.16	(0.13–0.20) ***	0.21	(0.16–0.27) ***	0.30	(0.24–0.38) ***	0.39	(0.29–0.53) ***
Nagelkerke R^2			0.16				0.07	
Correct classification rate			88.1				91.1	

OR unadjusted odds ratio only controlling for cohort, *AOR* adjusted odds ratio controlling for all other variables in model

* $p < 0.01$,
** $p < 0.001$,
*** $p < 0.0001$

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Table 4

Predictors of disapproval toward the use of LSD and heroin

	LSD disapproval (N = 7,664)			Heroin disapproval (N = 7,812)		
	OR	99 % CI	AOR	OR	99 % CI	AOR
Age <18	1.00		1.00	1.00		1.00
Age 18	0.93	(0.76–1.15)	1.04	1.09	(0.80–1.50)	1.18
Male	1.00		1.00	1.00		1.00
Female	2.00	(1.62–2.48) ***	1.91	(1.51–2.41) ***	1.43	(1.05–1.96) *
White	1.00		1.00	1.00		1.00
Black	2.44	(1.58–3.77) ***	1.20	(0.74–1.97)	1.31	(0.78–2.22)
Hispanic	1.12	(0.78–1.60)	1.06	(0.71–1.60)	0.86	(0.54–1.37)
Non-MSA	1.00		1.00	1.00		1.00
Small MSA	0.93	(0.76–1.14)	0.81	(0.60–1.10)	0.86	(0.64–1.18)
Large MSA	0.90	(0.72–1.13)	0.74	(0.53–1.03)	1.10	(0.78–1.53)
Low parent education	1.00		1.00	1.00		1.00
Moderate parent education	1.16	(0.93–1.46)	0.97	(0.72–1.30)	1.24	(0.88–1.74)
High parent education	0.81	(0.66–0.99) *	0.69	(0.52–0.91) **	0.98	(0.72–1.35)
Low religiosity	1.00		1.00	1.00		1.00
Moderate religiosity	1.28	(1.01–1.65) *	1.79	(1.38–2.34) ***	1.30	(0.91–1.87)
High religiosity	3.31	(2.49–4.40) ***	2.84	(2.06–3.94) ***	2.56	(1.68–3.88) ***
No lifetime alcohol use	1.00		1.00	1.00		1.00
Lifetime alcohol use	0.32	(0.24–0.43) ***	0.99	(0.68–1.43)	0.64	(0.43–0.94) *
No lifetime cigarette use	1.00		1.00	1.00		1.00
Lifetime cigarette use	0.26	(0.20–0.32) ***	0.58	(0.43–0.80) ***	0.35	(0.25–0.48) ***
No lifetime illicit drug use	1.00		1.00	1.00		1.00
Lifetime marijuana use, but no hard drug use	1.16	(0.91–1.49)	0.58	(0.40–0.84) **	1.18	(0.80–1.75)
Used one hard drug	0.73	(0.54–0.99) *	0.37	(0.25–0.56) ***	0.77	(0.48–1.22)
Used multiple hard drugs	0.13	(0.10–0.16) ***	0.13	(0.09–0.18) ***	0.30	(0.22–0.41) ***
Nagelkerke R^2			0.25			0.09
Correct classification rate			88.1			94.9

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OR unadjusted odds ratio only controlling for cohort, *AOR* adjusted odds ratio controlling for all other variables in model

*
**

' $p < 0.01$,
 d
'1000' $p < 0.0001$,
 d

Table 5

Predictors of disapproval toward the use of amphetamine and ecstasy

	Amphetamine disapproval (N = 7,792)			Ecstasy disapproval (N = 8,004)		
	OR	99 % CI	AOR	OR	99 % CI	AOR
Age <18	1.00		1.00	1.00		1.00
Age 18	0.96	(0.78–1.18)	1.07	0.92	(0.75–1.13)	1.06
Male	1.00		1.00	1.00		1.00
Female	1.33	(1.09–1.63)**	1.18	2.00	(1.62–2.46)***	1.85
White	1.00		1.00	1.00		1.00
Black	2.10	(1.41–3.13)***	1.10	1.09	(0.80–1.48)	0.55
Hispanic	1.39	(0.98–1.99)	1.34	0.65	(0.45–0.95)*	1.08
Non-MSA	1.00		1.00	1.00		1.00
Small MSA	0.83	(0.68–1.02)	0.73	0.77	(0.63–0.94)**	0.63
Large MSA	1.03	(0.83–1.28)	0.78	1.08	(0.86–1.36)	0.84
Low parent education	1.00		1.00	1.00		1.00
Moderate parent education	1.09	(0.87–1.35)	0.97	1.00	(0.80–1.25)	0.91
High parent education	0.87	(0.71–1.07)	0.74	0.87	(0.71–1.07)	0.71
Low religiosity	1.00		1.00	1.00		1.00
Moderate religiosity	1.21	(0.96–1.52)	1.54	1.24	(0.98–1.56)	1.65
High religiosity	2.64	(2.01–3.47)***	2.15	3.01	(2.26–4.01)***	2.60
No lifetime alcohol use	1.00		1.00	1.00		1.00
Lifetime alcohol use	0.34	(0.25–0.46)***	0.99	0.37	(0.28–0.50)***	1.04
No lifetime cigarette use	1.00		1.00	1.00		1.00
Lifetime cigarette use	0.28	(0.23–0.35)***	0.71	0.28	(0.22–0.35)***	0.60
No lifetime illicit drug use	1.00		1.00	1.00		1.00
Lifetime marijuana use, but no hard drug use	1.40	(1.08–1.82)**	0.60	1.13	(0.89–1.45)	0.62
Used one hard drug	0.70	(0.51–0.95)*	0.33	0.61	(0.45–0.83)***	0.35
Used multiple hard drugs	0.11	(0.09–0.14)***	0.10	0.15	(0.12–0.18)***	0.14
Nagelkerke R^2			0.23			0.22

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Amphetamine disapproval (N = 7,792)						Ecstasy disapproval (N = 8,004)					
OR	99 % CI	AOR	99 % CI	OR	99 % CI	OR	99 % CI	AOR	99 % CI	OR	99 % CI
Correct classification rate						87.1					
						88.5					

OR unadjusted odds ratio only controlling for cohort, AOR adjusted odds ratio controlling for all other variables in model

* $p < 0.01$,
** $p < 0.001$,
*** $p < 0.0001$