

Explaining the Recent Decline in Marijuana Use: Differentiating the Effects of Perceived Risks, Disapproval, and General Lifestyle Factors*

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Marijuana use among high school seniors has been declining since 1979. This paper explores two alternative explanations of this trend: that young people have become more conservative in general, or that specific changes in views about marijuana have led to the decline in its use. We report bivariate and multivariate analyses of questionnaire data from annual nationwide surveys of high school seniors, 1976 through 1986. Lifestyle factors such as religious commitment, truancy, and evenings away from home are linked strongly to individual differences in marijuana use; these factors, however, have not trended in ways that can account for much of the recent decline in marijuana use. On the other hand, the analyses suggest that if perceived risks and disapproval associated with regular marijuana use had not risen substantially in recent years, the decline in actual use would not have occurred. The implications for drug use prevention efforts are discussed.

The use of illicit drugs rose dramatically during the late 1960s and the 1970s, and the most widely used or "popular" of these drugs was marijuana (Miller, Cisin, Gardner-Keaton, Harrell, Wirtz, Abelson, and Fishburne 1983; National Commission on Marijuana and Drug Abuse 1972, 1973). Annual nationwide surveys of high school seniors, begun in 1975, monitored the continuing climb in marijuana use: from 1975 to 1978 annual prevalence rose from 40 to 50 percent, monthly prevalence rose from 27 to 37 percent, and use at a daily or near-daily level rose from 6.0 to 10.7 percent (Johnston, Bachman, and O'Malley 1979). In 1979, however, the rates of marijuana use among

seniors remained essentially the same as in 1978; 1980 marked the beginning of a steady decline, and by 1986 the rates had dropped to 1975 levels for annual prevalence (39%) and below 1975 levels for monthly prevalence (23%) and for daily or near-daily use (4.0%) (Johnston, O'Malley, and Bachman 1987). Analyses of follow-up data revealed that marijuana use among young adults also peaked in 1978-79 and declined subsequently, thus supporting the interpretation that there has been a secular trend or period effect, rather than sustained differences among cohorts or graduating classes (O'Malley, Bachman, and Johnston 1984; Johnston et al. 1987). Findings from national household surveys, summarized by Kozel and Adams (1986), provide further evidence of this secular trend.

What factors might explain the recent decline in marijuana use? Two quite different interpretations have been offered: 1) young people in recent years have become more "conservative"—that is, less "trouble-prone" in general; 2) there have been relatively specific changes in

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views about marijuana and the risks associated with its use. These two interpretations are not mutually exclusive, but they have important and distinctly different implications, especially with respect to drug abuse prevention efforts. In the present paper we explore these two explanations, employing data from the annual surveys of high school seniors.

BACKGROUND AND THEORETICAL CONSIDERATIONS

A growing number of studies has identified correlates and possible causes of drug use by young people (for reviews and summaries, see Glynn, Leukefeld, and Ludford 1983; Jessor 1979; Jessor, R. and S. L. Jessor, 1977; Jones and Battjes 1985; Kandel 1978, 1980, 1982; Lettieri and Ludford 1981; Murray and Perry 1985; Smith and Fogg 1978). Many of the possible determinants of drug use are included in the ongoing study of high school seniors. Earlier analyses showed marijuana use to be correlated strongly with truancy, frequent evenings away from home for recreation, and low religiosity; moderate correlations were found with a number of other dimensions reflecting lifestyles and values (Bachman, Johnston, and O'Malley 1981).

Our earlier analyses also showed that factors that were correlated with marijuana use were also correlated with the use of cigarettes, alcohol, and other illicit drugs. Furthermore, these patterns of correlation were highly consistent, even though the various drugs showed different trend patterns from year to year. We offered the following interpretation of these findings, which we quote at length because it is directly relevant to our present effort to understand trends in marijuana use:

We believe that some individuals seem especially disposed toward deviant or "problem" behavior (Jessor, R. and Jessor, S. L., 1977; Johnston, O' Malley, and Eveland, 1978; Smith and Fogg, 1978; Jessor, R., Chase, and Donovan, 1980). However, the particular forms of behavior chosen vary over different historical periods (as well as from one school or region to another). In the 1960s and 1970s illicit drug use emerged as an increasingly "popular" form of deviance; so instead of simply smoking cigarettes and

using alcohol, many of today's teenagers also use marijuana, and some use other illicit drugs. The emerging pattern of relationships with the use of cocaine may illustrate our point particularly well. In 1975, cocaine use was low and was not very strongly correlated with the background and lifestyle factors treated in this report. By 1979, usage levels were higher and the correlations were much stronger; however, the *patterns* of correlation were the familiar ones consistently in evidence for alcohol, marijuana, and other illicit drugs taken as a group. In other words, the kinds of young people most "at risk" tend to remain much the same, while the kinds and amounts of substances used shift somewhat from year to year. (Bachman et al., 1981, p. 67)

These observations were based on data from high school seniors in the classes of 1975 through 79, the period when marijuana continued to rise in popularity. Yet we think that this interpretation is fully applicable to the new data from the first half of the 1980s, the period in which trends in marijuana use reversed fairly dramatically. The question remains, however, why the popularity of marijuana declined.

One possible explanation is suggested by other trend data: the rise in perceived risks and disapproval associated with marijuana use, especially regular use. This rise was evident by the time of the 1980 survey, and the possible connection between these trends and the decline in actual use was proposed first in our report based on those data (Johnston, Bachman, and O'Malley 1981: 7). Several years later, using data from the senior classes of 1975 through 83, Johnston (1985) elaborated the argument, noting that the decline in marijuana use (a) was paralleled (actually preceded slightly) by rising concern about risks and by rising disapproval, and (b) was accompanied (again, actually preceded) by a considerable increase in the proportion of marijuana quitters who listed concerns about possible physical and/or psychological damage as reasons for quitting, but (c) was not associated with any appreciable change in the widespread perception that marijuana was easily available. In other words, changes in beliefs and attitudes may have led to changes in demand, but there was no evidence of a marked decline in (perceived) supply.

Jessor (1985), in commenting on Johnston's paper, found the above argument plausible but

"not yet compelling." Jessor pointed out that the aggregate trend data do not clearly establish causal order: "it remains quite possible that regular use of marijuana declined and beliefs about its harmfulness subsequently increased rather than the other way around." Jessor also noted that "... it is possible to entertain an equally plausible alternative hypothesis to account for both the increased perception of harm from regular use and the actual decline in regular use, namely, that there has been an increase in the general conventionality of adolescents during this same historical period. Such an increase in conventionality would lead to less motivation to use marijuana or to seek its effects, and would also imply greater receptivity to messages from authorities about the harmfulness of drug use" (259). The analyses reported here address both of these alternative explanations raised by Jessor.

Jessor commented further that in Johnston's paper "... the consonance of changes in beliefs about harmfulness and change in regular use is demonstrable only at the aggregate level: what remains a challenge is to demonstrate such consonance at the *individual* level, and that, of course, requires intra-individual data over time" (259). In the present paper we undertake analyses at the individual level, but not panel analyses tracking individuals across time. Such panel analyses, however, do not lack limitations of their own. One such limitation may be illustrated by recent trends in cigarette smoking. Even though habitual smokers may come to perceive greater risks, many will not change their behaviors because the habit can be quite difficult to break. Nevertheless, a rising secular trend in perceived risk may be a very important factor in deterring other individuals from adopting the behavior. Panel data would not be especially helpful in detecting such a phenomenon. Another limitation of social survey panel data is that usually it cannot detect very precisely the timing of shifts in attitudes and behaviors. Thus, if increased perceived risk and/or disapproval regarding marijuana is followed very *promptly* by a reduction or a cessation of use, that particular sequence of events is unlikely to be discriminated from other possible sequences, based on analyses of panel data collected annually, quarterly, or even monthly.

Previous studies established that drug use is correlated with attitudes and beliefs about drugs and drug use (e.g., Acock and DeFleur 1972;

Andrews and Kandel 1979; Kahle and Berman 1979; McAlister, Krosnick, and Milburn 1984). Kahle and Berman (1979), for example, used cross-lagged correlation analysis to estimate the relationships between attitudes and behaviors, while Andrews and Kandel (1979) examined the interrelationships using cross-lagged regression analysis. Within the relatively short periods examined (from two months to six months), both studies suggested that attitudes had stronger effects on subsequent drug use behavior than behavior had on later attitudes. Even so, the researchers were appropriately cautious in interpreting their results, and pointed out that reciprocal effects remained a possibility.

The emphasis has shifted from simply studying the relationships between attitudes and behavior to examining the role of background and immediate situational factors in both attitudes and behaviors. Andrews and Kandel (1979), for example, demonstrated the importance of peer groups to drug use. In the general literature, Liska (1984) argued recently that background factors, resources, and immediate situational factors may have greater direct influences on behavior than suspected previously. In keeping with this emphasis, in the present paper we examine behaviors and attitudes regarding marijuana in the context of a larger set of variables which are linked to drug use in general.

CONCEPTUAL APPROACH AND ANALYSIS STRATEGY

We have reviewed a number of issues which we consider relevant to an understanding of recent trends in marijuana use, and we have already suggested the sort of interpretation we consider most plausible. Now, by way of summary, we state more explicitly our conceptual approach toward interpreting these trends, and indicate some ways in which that perspective has shaped our analysis strategy.

For purposes of our present analyses and discussion, we divide predictors of marijuana use into two categories: 1) general background and lifestyle factors which are likely to relate not only to the use of marijuana but also to the use of other drugs, to delinquent behavior, and to a variety of other "problem," "deviant," or "antisocial" behaviors; 2) drug-specific factors, in this case those which relate directly to

marijuana use. We recognize that this distinction is too sharp to correspond fully to the real world; it is likely that some factors will predict more than one category of drug use, but not necessarily all; and other factors may predict many categories of drug use but may have little relationship with other problem behaviors. Nevertheless, we find the distinction workable for the particular variables employed in the present investigation and useful as a way of organizing conceptual and analytic matters.

The first category of predictors consists of individual characteristics (demographic background, personality, educational history, "lifestyle" patterns, etc.) which place some persons more "at risk" than others for becoming involved in a variety of "problem" behaviors, including drug use. Although prior analyses revealed some differences among drugs in patterns of background and lifestyle factors that predict use (Bachman et al. 1981), we consider the similarities far more impressive. Indeed, the very generality of predictive patterns across drugs makes it relatively unlikely, in our view, that trends upward or downward in the use of a particular drug are "explainable" (accompanied or preceded) by corresponding shifts in these general determinants of "risk." Nevertheless, in order to explore this possibility, one aspect of our present analyses is a search for trends in those factors which have proven to be important correlates of drug use in general. A less obvious aspect of the analyses is an examination of the extent to which the actual patterns of correlation shift over time, because it is not certain that the factors that predicted drug use in the 1970s will be equally good predictors in the 1980s. Thus, for example, levels of political liberalism/ conservatism may shift over time, and the closeness of the connection between that dimension and drug use also may change. Our analyses document the extent to which each of these kinds of trends has occurred during the past decade.

The second category of predictors is **drug-specific**, defined as those factors which relate primarily to the use of a particular drug rather than to drug use in general (or problem behavior in general). Such factors include the individual's awareness of the drug, perceptions of the effects (both short-term and long-term) of using the drug, perceived (as well as actual) availability, perceptions of use by friends and others, and perceptions that friends and relatives disapprove of using the drug. These drug-specific factors

are subject to change over time. Indeed, we consider them much more likely to change than the general factors related to the broad range of problem behaviors. Accordingly, given a trend of rising or falling use of a *particular* drug (rather than drugs in general), we consider it most likely that the explanation would be traceable to changes in drug-specific factors.

Obviously we think that both categories of predictors are important in accounting for an individual's drug use. We also recognize that there are considerable difficulties in isolating "effects" of one predictor from those of another; for that matter, it can also be quite difficult to determine whether the correlations we observe really represent *effects* of the predictors on drug use. In spite of these problems of interpretation, which we will note explicitly from time to time in our discussion of results, we believe that we can make some headway in understanding the probable causes of the recent decline in marijuana use.

Our approach to analysis and reporting is somewhat like that of a lawyer building a case (with mostly circumstantial evidence) rather than that of a physicist conducting a critical experiment. We begin with a set of repeated cross-sectional analyses, reporting the extent to which the levels of various predictors, and/or the strength of their correlations with marijuana use, have changed during the past decade. Then we employ the unusual strategy of combining data from eleven graduating classes (1976-1986) into a single data set in order to analyze secular trends within the broader context of individual differences in marijuana use and its correlates. These analyses explore the proposition that changes in perceived risks and disapproval may be primary contributors to the recent decline in marijuana use, but they also help us understand more fully how a much wider variety of factors has contributed to marijuana use by young people during the past decade. We conclude by discussing the implications of our findings in terms of both the etiology of drug use and drug abuse prevention efforts.

METHODS

Subjects

The data for our analyses were obtained from the Monitoring the Future project, an ongoing

study of youth conducted by the Institute for Social Research. Because the study design has been described extensively elsewhere (**Bachman** and Johnston 1978; **Bachman**, Johnston, and O'Malley 1987; Johnston et al. 1986), only the key features are noted here. The project involves surveys of nationally representative samples of high school seniors, conducted each year since 1975. The present analyses deal with data collected from 11 graduating classes, 1976 through 1986. (Data from the class of 1975 were not included because some differences in questionnaire formats for that year might have affected findings.)

A multistage sampling procedure (Kish 1965) is employed each year to select respondents representative of all seniors in the 48 contiguous states: Stage 1 selects particular geographic areas, Stage 2 selects one or more high schools in each area (a total of 130 to 135 schools, both public and private), and Stage 3 selects seniors within each high school.

Student response rates averaged 80 percent across the 11 surveys; absenteeism on the day of the survey accounted for nearly all of the nonresponse. As reported elsewhere, we conclude that if all absentees had been included in the surveys the estimated proportions of marijuana users would increase by less than three percent, and trend patterns across years would remain essentially unchanged (Johnston and O'Malley 1985; see also Johnston et al. 1987).

Data were collected via questionnaires administered in classrooms by locally based Institute for Social Research representatives and their assistants. The obtained sample sizes total approximately 17,000 per year. For most findings reported here, however, the annual sample sizes are 3,000 or slightly more because each annual survey includes five different questionnaire forms, and the items dealing with beliefs and attitudes about marijuana appear on single forms. (Each classroom administration includes all five forms, with each form assigned randomly to 20% of the respondents.) Because of the large number of cases, sampling errors are very small; any relationship that we treat as substantively important far exceeds conventional standards for statistical significance.

Measures

The questionnaire items dealing with marijuana use, perceived risks of marijuana use, and

personal disapproval of marijuana use are presented in Table 1. (Descriptions of other measures are incorporated in Table 2.) Complete question wordings for all items, along with response distributions and missing data rates, have been published separately (see **Bachman** et al. 1987 and prior volumes in the same series). The analyses reported here employed the measure of marijuana use during the previous 12 months. The seven response categories (shown in Table 1) provide a roughly logarithmic scale of use. We decided to employ this measure for the present report after exploratory analyses revealed (a) that measures of monthly use and daily use provided similar but lower patterns of correlation (attributable to their lower variance), and (b) that a composite measure combining data on monthly and annual use provided no stronger correlations than the simpler measure of annual use. The reliability of the measure of marijuana use in the previous 12 months is estimated to be .90, calculated by the Wiley and Wiley (1970) method (**O'Malley**, **Bachman**, and Johnston 1983; see also **Bachman**, O'Malley, and Johnston 1984); missing data rates for this item were four to five percent each year.¹

RESULTS AND DISCUSSION

Trends in Predictors and Patterns of Prediction

One key question raised in this paper is whether there have been any important trends in the variables identified as important predictors* of marijuana use. A second question is whether the patterns of correlation between predictors and drug use have shifted from one year to another. Either or both kinds of change may have occurred, and, if large enough, might account for the recent decline in marijuana use.

Overview of trends in background and lifestyle predictors. Our earlier analysis of background and lifestyle correlates of drug use showed quite similar patterns of prediction for five classes of seniors during the late 1970s, specifically 1975 through 1979 (**Bachman** et al. 1981). Recently we replicated and extended that analysis to include seniors from 1975 through 1986 (**Bachman**, O'Malley, and Johnston 1986). Four key findings and their implications for the present analysis are listed below.

TABLE 1. Measures of Marijuana Use, Perceived Risk, and Disapproval

Question	Text	Response	Alternatives
Marijuana Use (Forms 1-5)			
	On how many occasions (if any) have you used marijuana ... (Mark one circle for each line.)	1. 0 Occasions	
		2. 1-2 Occasions	
		3. 3-5 Occasions	
	a . . . in your lifetime?	4. 6-9 Occasions	
		5. 10-19 Occasions	
	b . . . during the last 12 months?	6. 20-39 Occasions	
		7. 40 or More Occasions	
	c . . . during the last 30 days?		
Perceived Risk (Form 5 Only)			
	The next questions ask for your opinions on the effects of using certain drugs and other substances. First, how much do you think people risk harming themselves (physically or in other ways), if they ...	1. No Risk	
		2. Slight Risk	
		3. Moderate Risk	
		4. Great Risk	
	b. Try marijuana (pot, grass) once or twice	5. Can't Say, Drug Unfamiliar	
	c. Smoke marijuana occasionally		
	d. Smoke marijuana regularly		
Disapproval (Form 3 Only)			
	Individuals differ in whether or not they disapprove of people doing certain things. Do YOU disapprove of people (who are 18 or older) doing each of the following? (Mark one circle for each line.)	1. Don't Disapprove	
		2. Disapprove	
		3. Strongly Disapprove	
	b. Trying marijuana (pot, grass) once or twice		
	c. Smoking marijuana occasionally		
	d. Smoking marijuana regularly		

1. Those factors which we found most important in predicting use of marijuana and other drugs during the late 1970s remained most important during the early 1980s. It continues to be true (a) that drug use is above average among those less successful in adapting to the educational environment (as indicated by truancy and low grades), those who spend many evenings out for recreation, those with heavy time commitments to a job, and those with relatively high incomes; and (b) that drug use is below average among those with strong religious commitments and those with conservative political views.

2. It also remains true that the background factors of sex, race, parental education, number of parents in the home, urbanicity , and region add relatively little in regression analyses when combined with lifestyle and experience factors. For that matter, even the zero-order correlations are quite modest at most. For these reasons we have omitted the background predictors (except sex) in the present analyses, and focus on a

more limited set of lifestyle and experience dimensions.³

3. There have been no large secular trends in the background and lifestyle predictor dimensions. The largest shift in any of the background dimensions was a rise of about .3 SD in mean parental education, but this dimension is virtually uncorrelated with marijuana use (correlations range from zero to .06). There was also a rise of about .4 SD in seniors' total income per week, but this increase would virtually disappear if adjusted for inflation. Some other smaller but interesting changes will be noted below; it is worth emphasizing here, however, that these changes in background and lifestyle predictors are not nearly large enough to explain the recent decline in marijuana use.

4. Although the levels of these predictor variables have not changed much during the past decade, there have been several shifts in the strength of their correlations with drug use. Most interesting, perhaps, is that both political conservatism and religious commitment are now

linked less closely to drug use, particularly to marijuana use. These changes in patterns of correlation, as well as other, more subtle changes, are shown more clearly in the analyses that follow.

Trends in lifestyle factors predicting marijuana use. Table 2 presents two kinds of trend data for each of the key lifestyle variables, shown separately for each of 11 senior classes (1976–86). The table displays percentage distributions for each category of lifestyle predictor, so any overall shift in the proportions of seniors falling into each category can be discerned. More important, the table displays bivariate relationships: mean annual marijuana use (on the seven-point scale) for each predictor category, along with correlation coefficients showing strength of relationship.⁴ In keeping with the overview of trends presented above, Table 2 shows that during the past decade there has been a good deal of consistency in relationships between lifestyle factors and marijuana use, and that there have been no large secular trends in these lifestyle factors. Nevertheless, Table 2 provides evidence of several more subtle changes, and these receive a more detailed analysis below.

In terms of our present focus, however, the most important finding shown in Table 2 is the ubiquity of the secular trend in marijuana use: an increase from 1976 through 1978–79, and a decline thereafter for every subgroup defined on every variable. Thus, for example, if we focus only on those seniors who reported no truancy, mean marijuana use among such “nontruants” in the classes of 1978–79 was higher than among nontruants in the class of 1976, but with succeeding classes after 1979 the rate of marijuana use among nontruants trended downward. The same general pattern appears for those who reported low truancy, as well as for those who reported relatively high levels of truancy. (These several categories of truancy show some interesting differences in strength of trends, as we discuss below; nevertheless, the key finding in Table 2 is that each level of truancy shows the same overall trend pattern.) We selected truancy for this example because we noted a weak secular trend along this dimension: slightly fewer seniors in recent classes reached the highest level of truancy, while slightly more reported no truancy. Because truancy is correlated fairly strongly with

marijuana use, one might suppose that a decline in truancy rates would *cause* or *contribute to* a decline in marijuana use. Yet Table 2 shows that even when we “hold constant” the level of truancy from year to year, a strong secular trend in marijuana use remains. The same can be said for each category of each of the other predictors shown in Table 2. At least when we examine them one at a time, not one of these variables can “account for” or “explain” in any substantial way the recent decline in mean levels of marijuana use among high school seniors. (In the next section we consider whether the full set of variables shown in Table 2, combined in a multivariate analysis, can account for the secular trend in marijuana use.)

A more detailed examination of Table 2 reveals several additional patterns of interest. Turning first to the measures of educational adjustment and success, we note indications of a slight improvement in what might be termed seniors’ commitment to education. As noted above, truancy has decreased slightly since 1978–79. There was also a slight increase in proportions of seniors in the college preparatory curriculum, and in proportions planning to complete college (not shown in Table 2; see **Bachman et al. 1986**). As Table 2 indicates, these trends were not accompanied by any overall rise in classroom grades; the lack of such change, however, could reflect teachers’ resistance to anything suggesting “grade inflation” and/or stable tendencies to “grade on the curve,” which would tend to prevent secular trends in grades. Of particular interest for present purposes is the fact that the upward and downward trends in marijuana use were more pronounced among those least successfully adjusted to the educational system. To some extent, at least, this finding represents a “floor” effect; among the “high-risk” categories, marijuana use was relatively frequent in 1979, thus permitting much more room for downward movement in subsequent cohorts of seniors. In 1979, for example, the high truancy seniors averaged about 4.8 on the 1–7 scale of marijuana use, whereas in 1986 the high-truancy seniors averaged only 3.6. Among the nontruant seniors, the same period showed a decline from about 2.1 to 1.7 in mean marijuana use (where 1.0 represents zero use). A similar phenomenon is evident for grades but is much less pronounced, as might be expected in view of the

TABLE 2. Trends in Marijuana Annual Use Means (1-7 Scale) for Each Level of a Set of Lifestyle Factors: High School Seniors, 1976-1986

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
R's sex											
Male											
Mean MJ. use	3.003	3.104	3.288	3.245	3.071	2.876	2.687	2.606	2.479	2.483	2.387
% in category	49.7	48.2	48.5	48.4	49.0	49.4	49.9	49.4	49.1	48.7	47.9
Female											
Mean MJ. use	2.344	2.516	2.632	2.651	2.514	2.392	2.303	2.142	2.054	2.089	2.013
% in category	50.3	51.8	51.5	51.6	51.0	50.6	50.1	50.6	50.9	51.3	52.1
r	-.145	-.127	-.138	-.125	-.122	-.110	-.091	-.114	-.108	-.100	-.098
High school grade											
C or lower											
Mean MJ. use	3.408	3.570	3.628	3.689	3.515	3.276	3.163	3.003	2.793	2.888	2.842
% in category	13.0	13.2	13.6	13.2	14.1	13.1	14.7	15.3	15.2	14.2	15.3
C+/B											
Mean MJ. use	2.988	3.139	3.347	3.258	3.091	2.954	2.803	2.620	2.521	2.497	2.352
% in category	27.3	27.9	28.6	28.2	27.0	28.0	28.3	29.2	29.2	28.6	28.9
B/B+											
Mean MJ. use	2.516	2.650	2.731	2.780	2.610	2.519	2.334	2.192	2.097	2.112	2.061
% in category	40.1	39.6	39.0	38.1	38.8	38.6	37.5	36.7	36.8	37.5	37.3
A-IA											
Mean MJ. use	1.988	1.981	2.191	2.235	2.134	1.945	1.831	1.741	1.718	1.761	1.667
% in category	19.6	19.3	18.9	20.5	20.1	20.3	19.6	18.8	18.8	19.7	18.5
r	-.204	-.224	-.209	-.203	-.198	-.192	-.212	-.209	-.189	-.191	-.194
Truancy composite											
Code 10 (none)											
Mean MJ. use	1.928	2.030	2.108	2.121	1.995	1.975	1.924	1.868	1.788	1.808	1.710
% in category	50.8	46.4	51.3	51.0	50.3	51.4	54.5	56.3	58.1	55.6	56.0
Code 15 (low)											
Mean MJ. use	2.765	2.716	3.053	3.004	2.869	2.691	2.610	2.445	2.373	2.343	2.319
% in category	17.9	18.7	17.8	16.8	17.6	17.5	17.3	16.5	16.7	16.8	17.1
Code 20											
Mean MJ. use	3.199	3.314	3.816	3.619	3.330	3.224	3.050	2.905	2.888	2.678	2.708
% in category	10.3	12.4	10.8	11.5	11.0	11.0	10.5	9.8	9.3	10.2	10.4
Code 25											
Mean MJ. use	3.759	3.502	3.983	4.000	3.945	3.550	3.452	3.334	3.192	3.243	3.007
% in category	6.7	7.8	6.5	6.8	6.9	6.3	6.4	6.1	5.8	6.0	5.8
Code 30-65 (high)											
Mean MJ. use	4.459	4.549	4.743	4.784	4.573	4.182	4.088	3.788	3.743	3.713	3.609
% in category	14.3	14.7	13.5	13.9	14.1	13.8	11.4	11.3	10.1	11.4	10.6
r	-.397	-.383	-.389	-.400	-.401	-.354	-.347	-.328	-.337	-.331	-.324
Hours worked/week											
0 hours											
Mean MJ. use	2.443	2.501	2.488	2.457	2.398	2.302	2.253	2.175	2.083	2.050	2.038
% in category	25.8	23.4	21.8	19.7	19.5	21.3	23.2	24.6	24.9	24.4	23.1
1-10											
Mean MJ. use	2.432	2.413	2.531	2.515	2.510	2.400	2.239	2.050	2.031	2.041	1.917
% in category	21.3	19.9	19.2	18.7	18.5	20.1	20.9	21.1	20.1	20.1	19.3
11-20											
Mean MJ. use	2.664	2.841	2.986	2.970	2.783	2.703	2.595	2.443	2.264	2.291	2.219
% in category	23.6	24.5	25.4	26.6	28.8	27.8	27.3	26.8	25.9	25.9	27.4
21-30											
Mean MJ. use	2.962	3.120	3.404	3.359	3.086	2.930	2.722	2.655	2.494	2.554	2.387
% in category	18.6	20.5	21.6	23.6	22.9	21.2	19.9	18.7	19.7	20.7	20.5
31 or more											
Mean MJ. use	3.043	3.191	3.337	3.334	3.186	2.867	2.828	2.656	2.537	2.539	2.536
% in category	10.7	11.7	12.0	11.5	10.4	9.7	8.7	8.8	9.4	8.9	9.7
r	.100	.126	.152	.156	.125	.110	.106	.106	.095	.105	.096

(Continued)

TABLE 2. (Continued)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Total weekly income											
\$0											
Mean MJ. use	2.210	2.116	2.193	2.077	2.168	2.007	1.970	1.908	1.792	1.698	1.623
% in category	6.3	6.4	5.6	5.0	5.1	5.4	5.4	5.8	5.4	5.2	4.5
\$1-25											
Mean MJ. use	2.429	2.452	2.510	2.494	2.445	2.344	2.235	2.084	1.951	1.987	1.934
% in category	42.2	36.6	31.8	28.9	26.6	28.8	29.7	30.9	29.2	28.2	25.3
\$17-60											
Mean MJ. use	2.761	2.872	3.018	2.993	2.722	2.625	2.491	2.323	2.265	2.231	2.124
% in category	32.2	33.2	31.8	30.0	29.8	27.6	25.1	23.7	24.0	23.8	24.0
\$42 +											
Mean MJ. use	3.122	3.310	3.396	3.331	3.106	2.927	2.745	2.647	2.493	2.529	2.409
% in category	19.3	23.9	30.8	36.1	38.5	38.2	39.7	39.6	41.5	42.8	46.2
r	.128	.168	.174	.170	.135	.134	.121	.130	.132	.138	.120
Religious commitment index											
10-15 (low)											
Mean MJ. use	3.732	3.769	3.940	3.866	3.544	3.298	3.055	3.163	2.949	2.939	2.741
% in category	14.3	12.9	12.5	12.1	11.6	12.6	12.8	12.5	13.5	15.2	16.0
20-25											
Mean MJ. use	3.228	3.325	3.470	3.510	3.363	3.118	2.945	2.782	2.624	2.590	2.509
% in category	30.6	32.8	33.0	31.5	30.0	31.4	33.5	33.3	32.9	33.9	34.1
30-35											
Mean MJ. use	2.406	2.567	2.704	2.767	2.661	2.521	2.322	2.156	2.099	2.076	2.003
% in category	34.6	34.8	35.1	35.3	35.0	34.8	34.6	34.0	33.2	32.4	32.5
40 (high)											
Mean MJ. use	1.558	1.638	1.818	1.794	1.826	1.691	1.629	1.523	1.507	1.486	1.423
% in category	20.5	19.5	19.4	21.0	23.4	21.3	19.0	20.3	20.4	18.6	17.4
r	-.321	-.305	-.293	-.294	-.263	-.253	-.233	-.269	-.246	-.246	-.233
Political belief											
Very conservative											
Mean MJ. use	2.435	2.253	2.593	2.407	2.307	2.145	2.201	2.008	1.996	1.893	1.965
% in category	2.4	2.9	2.8	3.1	3.3	3.4	3.2	2.9	3.4	3.5	3.5
Conservative											
Mean MJ. use	2.137	2.396	2.545	2.429	2.458	2.321	2.226	2.086	2.012	2.016	1.993
% in category	11.7	12.8	13.1	13.4	14.2	15.4	14.2	12.5	13.3	14.9	13.5
Moderate											
Mean MJ. use	2.368	2.586	2.699	2.798	2.674	2.550	2.355	2.262	2.215	2.164	2.104
% in category	33.8	33.5	32.2	31.7	33.2	33.0	31.2	31.8	32.0	30.9	30.9
Liberal											
Mean MJ. use	3.242	3.320	3.502	3.420	3.124	3.032	2.857	2.610	2.364	2.448	2.377
% in category	19.9	18.9	18.2	16.8	15.7	14.7	14.7	14.2	14.6	16.1	15.7
Very liberal											
Mean MJ. use	3.830	3.832	4.001	3.783	3.624	3.145	2.956	2.867	2.651	2.724	2.680
% in category	4.4	3.8	3.6	3.5	3.0	3.0	2.9	3.0	3.0	3.1	3.5
Radical											
Mean MJ. use	4.088	4.043	4.337	4.461	4.252	4.061	3.784	3.651	3.511	3.477	3.256
% in category	2.7	2.3	2.5	3.0	2.9	3.0	2.8	2.8	2.8	2.9	2.7
None of the above, or don't know											
Mean MJ. use	2.532	2.655	2.813	2.815	2.694	2.536	2.448	2.346	2.255	2.301	2.139
% in category	25.2	25.9	27.6	28.6	27.6	27.6	31.1	32.8	30.9	28.7	30.2
r (excluding last category)	.226	.195	.195	.205	.176	.172	.156	.159	.136	.151	.134

(Continued)

TABLE 2. (Continued)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Evenings out per week 1 or fewer											
Mean MJ. use	1.672	1.769	1.886	1.910	1.850	1.783	1.663	1.613	1.572	1.596	1.543
% in category	20.8	20.7	19.3	19.6	21.1	22.1	22.7	22.0	23.1	21.4	22.3
2-3											
Mean MJ. use	2.487	2.611	2.715	2.712	2.619	2.519	2.417	2.278	2.180	2.124	2.079
% in category	52.4	51.7	54.7	54.1	56.0	56.6	55.8	55.2	55.9	56.3	55.3
4-5											
Mean MJ. use	3.487	3.578	3.911	3.859	3.692	3.564	3.375	3.090	2.935	3.016	2.854
% in category	18.0	18.5	17.8	17.9	16.3	15.2	15.2	16.4	14.7	15.3	15.8
6-7											
Mean MJ. use	4.260	4.385	4.566	4.607	4.616	4.192	3.847	3.653	3.614	3.717	3.653
% in category	8.9	9.0	8.2	8.4	6.6	6.1	6.3	6.4	6.4	7.0	6.6
r	.334	.337	.339	.340	.337	.313	.308	.286	.286	.297	.292

^a The religious commitment index is a mean of two items: How often do you attend religious services? (1 = Never . . . 4 = About once a week or more); How important is religion in your life? (1 = Not important . . . 4 = Very important). The product-moment correlation between these two items is approximately .55.

much lower overall correlation between grades and marijuana use.

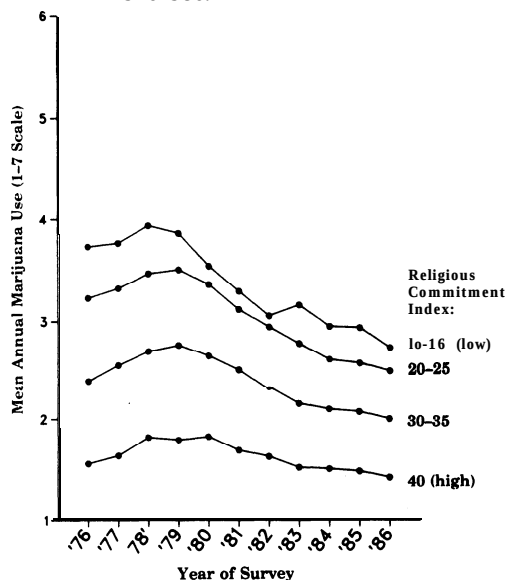
Turning next to the two measures related to part-time work, we see again that among seniors in the "higher-risk" categories (long hours of work, high weekly incomes) the downward trend in marijuana use from the class of 1979 to the class of 1986 was about twice as great as among those with little or no involvement in part-time work. As noted earlier, weekly income rose consistently throughout the decade studied. We assume, however, that this rise reflects primarily the effects of inflation; our income measure is not sufficiently detailed to permit a precise assessment of inflation effects, but for present purposes that seems unnecessary. More important, the proportions of seniors working 21 to 30 hours a week, as well as the proportions working 31 or more hours, declined slightly after 1979. Here again, as in the case of truancy, the shift is far too small to explain the decline in marijuana use during the 1980s, but we cannot rule out the **reverse** possibility that the decline in marijuana use helped reduce truancy and long hours of part-time work. We will return later to this point.

Turning now to the section in Table 2 dealing with religious commitment, we see yet another pattern of findings. The proportion of seniors indicating the strongest commitment declined slightly from 23 percent in 1980 to 17 percent in 1986, whereas the proportion with the lowest commitment rose from 12 percent to 16 percent during the same period. This small shift is interesting only because it is exactly the

opposite of what might be expected in view of the negative correlation between religious commitment and marijuana use. Clearly, it could not have been any overall increase in religious involvement which caused the recent decline in marijuana use, nor did changing marijuana use give rise to increased religious values. Another interesting finding is that the correlations between religious commitment and marijuana use grew progressively weaker from 1976 onward; this trend might be viewed as an indication that religion gradually is becoming less central in decisions about whether to use marijuana. On the other hand, as Figure 1 displays clearly, the upward and then downward secular trend appears only weakly among those with strong religious ties, whereas it is more pronounced among those seniors reporting little religious commitment. Thus it appears that those most "protected" by their high commitment to religion were influenced least by shifts in the popularity of marijuana during the past decade.

Political beliefs (conservative versus liberal or radical) show somewhat weaker links with marijuana use than we note for religious commitment, but here again we see a pattern of declining correlations from 1976 onward. This time the explanation for a weakening association seems fairly obvious: marijuana use during the late 1960s and early 1970s was linked to political opposition to the war in Vietnam (Johnston 1973; Suchman 1968), and such links grew progressively weaker as the Vietnam involvement receded gradually from the **fore-**

Figure 1 Trends in Annual Marijuana Use Shown Separately for Four Levels of Religious Commitment. High School Seniors, 1976-1986.



front of political awareness. There were also trends in political beliefs. The proportions of seniors describing themselves as conservative or very conservative increased slightly from 14 percent in 1976 to 18 percent in 1980, whereas the proportions listing themselves as liberal or very liberal declined from 24 percent to 19 percent; during the early 1980s both proportions remained fairly stable. It seems unlikely that these very small secular trends in political views in the late 1970s had much connection with the decline in marijuana use during the 1980s. The one other finding parallels the finding reported for the other predictors: students in the “higher-risk” categories—in this case individuals with liberal or radical political views—showed stronger trends in marijuana use (e.g., means declined about 1.1 on our 7-point scale from 1979 through 1986) compared with those less at risk (among conservatives mean use declined only by about 0.5).

One other lifestyle variable displayed in Table 2 is seniors’ reports of how many evenings per week they “go out for fun and recreation.” Here again, the most pronounced secular trends in marijuana use are evident among those in the highest-risk category: in this case, those reporting that they spent most evenings each week out for fun and recreation. The correlation between

evenings out and marijuana use held steady at about .33 for the senior classes of 1976 through 80, and ranged from .28 to .30 for subsequent classes. The proportions of seniors spending most evenings out (four or more per week) declined slightly from the 1970s (25.28%) to the 1980s (21–23%), but this shift was too small to be very significant in the much larger decline in marijuana use during the 1980s. On the other hand, we are particularly concerned here with the opposite direction of causation. If seniors during the 1980s became somewhat less eager to consume marijuana, that decline may have led in turn to a slight overall reduction in their needs or desires to spend evenings away from home. In other words, although it seems obvious that being away from home increases the opportunities for seniors to use marijuana, it also seems likely that for some seniors the intention to smoke marijuana may be a primary reason for being away from home.

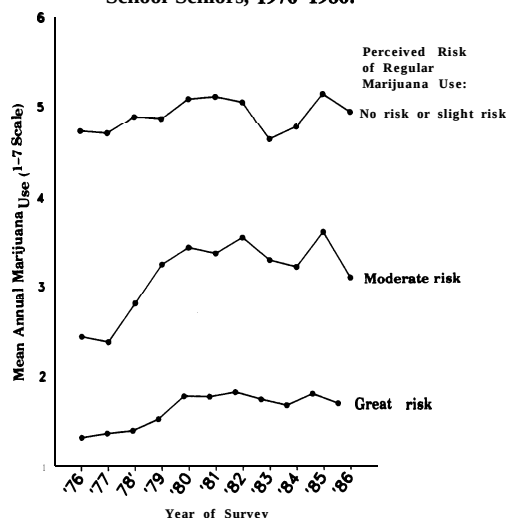
Summarizing the findings presented in this section, we see that the secular trend in marijuana use—a rise until 1978-79 and a decline thereafter—is evident across the full set of lifestyle variables displayed in Table 2. Yet all categories of the variables do not show this trend equally; it is more pronounced in the “higher-risk” categories. In view of the evidence presented thus far, does it seem likely that shifts in some of the lifestyle predictors are primarily responsible for the recent trends in marijuana use, particularly for the downturn since 1979? We think not. There are several different secular trends in the lifestyle variables shown in Table 2; some are in the wrong direction to account for the downturn in marijuana use, and in any case none of the trends is nearly strong enough to do so. If anything, a reverse causal interpretation would be more consistent with some of the data: it may be that the decline in marijuana use during the 1980s contributed to the slight reductions in truancy and evenings out during the same period.

All the evidence presented above is based on bivariate analyses; we examined a number of lifestyle predictors one at a time. The possibility remains, however, that when these predictors are combined multivariately they may do more to account for trends in marijuana use, and we explore that possibility below. First, however, we turn to another set of predictors, which

(unlike those in Table 2) have shown very strong secular trends in recent years.

Trends in perceived risk and disapproval predicting marijuana use. Between 1977 or 1978' and 1986, the proportion of seniors perceiving no risk in regular marijuana use dropped from 13 percent to near zero, while those perceiving great risk doubled from 37 percent to 75 percent. During the same period, the proportion not disapproving of regular marijuana use dropped by two-thirds, from 33 percent to 11 percent, while the proportion strongly disapproving rose from 40 percent to 67 percent. Were these sharp shifts in proportions accompanied by substantial changes in the way disapproval and perceptions of risk related to actual use of marijuana? Here, in contrast to Table 2, we do not see within each predictor category any clear and consistent drop in marijuana use from 1978-79 onward. Beginning with the data for perceived risk, shown in the upper half of Table 3 and also displayed in Figure 2, we note that in each class of seniors, those who perceived great risk in regular

Figure 2. Trends in Annual Marijuana Use Shown Separately for Three Levels of Perceived Risk of Regular Marijuana Use: High School Seniors, 1976-1986.



marijuana use also reported very little actual use during the previous year (means across all 11 classes average 1.6 on the scale of 1 to 7), those

TABLE 3. Trends in Marijuana Annual Use Means (1-7 Scale) for Each Level of Perceived Risk and Disapproval of Regular Use: High School Seniors, 1976-1986

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986
Perceived risk of regular marijuana use											
Mean MJ. use	5.502	5.621	5.885	5.756	5.893	5.831	5.645	4.884	4.948	5.029	5.310
% in category	12.9	13.2	12.3	8.1	3.6	2.1	2.3	2.2	1.8	1.5	1.2
Slight risk											
Mean MJ. use	4.279	4.200	4.375	4.529	4.879	4.978	4.890	4.590	4.732	5.166	4.859
% in category	21.4	23.3	23.4	20.8	14.2	11.9	90.0	9.1	7.4	5.7	5.3
Moderate risk											
Mean MJ. use	2.458	2.395	2.815	3.244	3.429	3.361	3.536	3.286	3.208	3.594	3.090
% in category	25.1	25.1	27.7	27.3	28.9	25.7	25.1	22.9	20.3	19.3	19.1
Great risk											
Mean MJ. use	1.330	1.374	1.403	1.527	1.773	1.766	1.815	1.735	1.668	1.793	1.686
% in category	40.6	38.4	36.5	43.8	53.3	60.3	63.6	65.8	70.4	73.5	74.5
r	-0.660	-0.654	-0.647	-0.608	-0.560	-0.545	-0.523	-0.490	-0.513	-0.505	-0.485
Disapproval of regular marijuana use											
Don't disapprove											
Mean MJ. use	5.038	5.105	5.246	5.245	5.199	5.202	5.298	5.207	5.156	5.191	5.364
% in category	28.8	32.8	30.9	29.8	23.5	21.0	17.3	15.4	13.5	12.2	11.1
Disapprove											
Mean MJ. use	2.453	2.456	2.754	2.844	2.907	2.929	2.879	2.802	3.017	2.986	
% in category	27.7	26.7	27.8	29.6	28.0	28.9	26.7	27.2	24.7	24.1	22.2
Strongly disapprove											
Mean MJ. use	1.220	1.298	1.321	1.394	1.391	1.446	1.414	1.361	1.402	1.446	1.393
% in category	43.4	40.5	41.3	40.6	48.5	50.1	55.9	57.4	61.8	63.6	66.7
r	-0.693	-0.687	-0.691	-0.668	-0.673	-0.655	-0.672	-0.673	-0.661	-0.643	-0.671

who perceived moderate risk reported more use (an average of 3.1), those who perceived only slight risk reported substantially higher levels of actual use (an average of 4.7), and those who indicated that they saw no risk in regular marijuana use reported still higher rates of use (an average of 5.5). Thus we conclude (a) that a very strong association exists between perceived risk and rate of self-reported use of marijuana, and (b) that this pattern of association has not changed much, especially since 1980.5

The data for disapproval tell much the same story. Those who disapproved strongly of regular marijuana use also reported low levels of actual use (means average 1.4 on the scale of 1 to 7), those who "merely" disapproved showed consistently higher mean levels of use (about 2.8), and those who did not disapprove showed much higher mean levels of use (about 5.2). In other words, although in each year following 1979 increased proportions of seniors disapproved of regular marijuana use, the amounts of use associated with each level of disapproval remained essentially the same; thus "nondisprovers" still report high mean levels of actual marijuana use, but nowadays far fewer seniors do not disapprove of regular marijuana use.

Table 3 suggests the following primary conclusion: if there had not been substantial secular trends in attitudes about marijuana, starting in the late 1970s, the (smaller) secular trend in actual use probably would not have occurred. In a sense, it appears that "controlling for" the recent rise in perceived risks and disapproval is one way of "accounting for" the corresponding downturn in marijuana use. Yet a question arises naturally: is a reverse explanation equally plausible? Could one just as well "explain" the shifts in *attitudes* by controlling trends in marijuana use? Analyses that were essentially the mirror image of those reported in Table 3 produced a negative answer to that question. We found that "...controlling for the behavior of marijuana use does nothing to reduce or 'explain away' the upward trend from 1978 through 1985 in negative attitudes about marijuana. Subgroups consisting of frequent users, infrequent users, and non-users, all show substantial increases in the proportions who disapprove of marijuana use and perceive that such use is risky" (Bachman, Johnston, O'Malley, and Humphrey 1986: 14). In addition, these findings held true not only for views about

regular use, but also for views about occasional and experimental use of marijuana.

Before leaving Table 3 we call attention to the coefficients summarizing the strength of correlation between each of the attitudes and annual marijuana use. They are much larger than any of the correlations displayed in Table 2, and reflect the very close association between individuals' expressed views about marijuana and their reports of actual use. (We also note in passing some downward shift in the size of correlations involving perceived risks, which reflects not a shift in the shape of the relationship-as has been demonstrated- but rather a reduction in variance; more than one-third of all seniors in 1976-78 saw slight or no risk in regular use, whereas in the classes of 1985 and 1986 only seven percent were equally sanguine.)

Multivariate Analyses Combining Lifestyle Factors, Attitudes, and Secular Trends

The above analyses examined separately each of 11 classes of high school seniors, reporting bivariate relationships between marijuana use and each of several factors that may influence such use. These analyses reveal a number of important relationships as well as trends across the past decade, but we do not yet see clearly how these findings are interrelated. We turn now to that task.

Our approach to analysis is relatively simple: we computed product-moment correlations (two matrices, one based on questionnaire Form 5 data and the other based on questionnaire Form 3 data), carried out multiple regression analyses using various sets of predictors, and compared predictor sets to ascertain unique and overlapping portions of explained variance. Although this general strategy is not at all out of the ordinary, the correlation matrices are unusual in some respects. Each matrix is based on an analysis file which pools data from all 11 classes of seniors. One obvious reason for such pooling is that it is a useful way to simplify reporting, because we have shown already that correlations between marijuana use and the other variables either remained unchanged or changed only modestly during the past decade.

A much more important reason for pooling the data across cohorts is that it permitted us to assign a new variable to each individual,

consisting of the mean marijuana use (during the previous 12 months) reported by all seniors during the year in which the individual graduated. Thus we were able to include in each matrix the correlation between individual marijuana use and mean marijuana use among seniors for that year. We interpret that correlation as reflecting the extent to which individual variance in marijuana use over the past decade is “explainable” or “interpretable” in terms of the overall secular trend in use. Accordingly, sometimes we refer to this variable as a measure of the secular trend in marijuana use.⁶

We computed two sets of correlations using the pooled data sets described above. (Both matrices are presented in the appendix.) One matrix, based on Form 5, includes annual marijuana use, the set of eight dimensions that appear in Table 2, perceived risk of regular marijuana use, and the new variable indicating the secular trend in marijuana use. The other matrix, based on Form 3, includes the disapproval measure instead of the measure of perceived risk, and otherwise is the same as the first matrix. (Thus most of the correlations in one matrix are replicated in the other matrix. The replications are nearly identical; we attribute the small disparities to random differences between Form 3 and Form 5 subsamples, rather than to any differential question context effects induced by the two forms. Preliminary analyses of correlations and regression coefficients computed separately for males and females revealed no important differences; accordingly, the analyses presented here are based on combined data for both sexes.)

Table 4 presents a series of regression analyses in which several sets of variables are used to predict individual seniors’ self-reported amounts of marijuana use during the past year. Three predictor sets, examined separately and then in combination, are: (Set A) the eight variables presented in Table 2 (“lifestyle” dimensions, plus sex); (Set B) perceived risks of regular marijuana use (upper half of Table 4), or personal disapproval of regular marijuana use (lower half of Table 4); (Set C) mean marijuana use for all seniors during year of graduation (secular trend in marijuana use).

The lifestyle variables in Set A account for 25 percent of the variance in annual marijuana use. The standardized regression coefficients indicate that truancy, religious commitment, and eve-

nings out are the most important predictors, consistent with our earlier findings (Bachman et al. 1981).

Jumping ahead to Set C, we can see that the overall secular trend in marijuana use can account for only a small amount of variance in individual use (about 1.5%). This finding serves as a useful reminder that although year-to-year variations in marijuana use over the past decade are important and interesting, such variations remain small in comparison to the wide range of variability among seniors within each year of the study.

The findings thus far make it clear that if one wished to predict marijuana use by a high school senior during the past decade, knowing the senior’s religiosity, patterns of truancy, and evenings out would be much more helpful than knowing the year of graduation. But one would do better still with both types of predictors, as indicated by the regression findings for Set A + C. The particular importance of this part of the analysis is the finding that including the lifestyle variables (Set A) as predictors does not substantially change the beta coefficients for the secular trend measure (Set C). In other words, most of the secular trend cannot be “explained” by the lifestyle variables.

Turning now to Set B, we see that the single measure of perceived risk correlates more strongly with marijuana use than does the whole group of predictors in Set A, and that the single measure of disapproval correlates still more strongly. Yet the real point of the analysis is evident when we compare Set B with Set B + C; we find that in the presence of either of the attitude measures, the secular trend effect is reduced essentially to zero. For the sake of completeness, we note the same finding when the Set A variables are included; comparing Set A+B with Set A+B +C, we see again that when an attitude measure appears in the equation, the secular trend measure makes no addition to explained variance.

In sum, comparisons among these regression analyses indicate that the secular trend in marijuana use cannot be “explained” in terms of the lifestyle measures included in Set A, but the trend *can* be “explained” either by the measure of perceived risk or by the measure of disapproval.⁷

An additional observation can be based on the regression results for Set A +B (or Set

TABLE 4. Multiple Regression Analyses Predicting Annual Marijuana Use (1-7 Scale for A) Lifestyle Variables, B) Attitudes about Marijuana, and C) Mean Marijuana Use Per Year: High School Seniors, Classes of 1976-1986, Combined

Data from Questionnaire Form 5								
Predictor	r	A.	B.	C.	A. +B.	A. +C.	B. +C.	A. +B. +C.
A. Lifestyle variables								
Grades	-.202	-.090			-.068	-.093		-.067
Truancy	.363	.239			.160	.233		.160
Hours worked per week	.128	.070			.035	.055		.037
Average weekly income	.123	-.005*			.025	.014		.022
Religious commitment	-.256	-.148			-.079	-.152		-.077
Political beliefs	.174	.107			.059	.105		.059
Evenings out per week	.321	.226			.150	.220		.151
Sex (M= 1, F=2)	-.112	-.035			-.013	-.033		-.013
B. Perceived risk of regular marijuana use								
	-.574		-.574		-.452		-.586	-.458
C. Mean marijuana use per year								
	.125			.125		.105	-.042	-.019
R		.496	.574	.124	.647	.507	.576	.648
R ²		.246	.330	.016	.419	.257	.331	.420
Data from Questionnaire Form 3								
Predictor	r	A.	B.	C.	A. +B.	A. +C.	B. +C.	A. +B. +C.
A. Lifestyle variables								
Grades	-.206	-.091			-.045	-.094		-.045
Truancy	.362	.239			.135	.233		.135
Hours worked per week	.117	.038			.011	.021		.012
Average weekly income	.131	.028			.038	.047		.037
Religious commitment	-.269	-.171			-.051	-.176		-.051
Political beliefs	.170	.090			.025	.089		.025
Evenings out per week	.315	.219			.111	.213		.111
Sex (M= 1, F=2)	-.114	-.030			-.018	-.030		-.018
B. Disapproval of regular marijuana use								
	-.677		-.677		-.573		-.680	-.574
C. Mean marijuana use per year								
	.120			.120		.105	-.015	-.003*
R		.497	.677	.120	.713	.507	.678	.713
R ²		.247	.459	.015	.508	.257	.459	.508

* p>.05.
Note: Entries in the first column are product-moment correlation coefficients (r); entries in the bottom rows are multiple correlation coefficients (R and R²), adjusted for degrees of freedom; all other table entries are standardized regression coefficients.

A + B + C, as the results are essentially identical). Although the attitude measure (either perceived risk or disapproval) is by far the most powerful predictor, the fact that other predictors, such as truancy and evenings out, retain appreciable standardized regression coefficients suggests that at least portions of their relationships with marijuana use do not occur through their impacts on attitudes. That finding leaves open various other causal interpretations, including the possibility that marijuana use (or intention to use) contributes to truancy and

evenings out. (This interpretation is compatible with the notion that the very slight secular trends downward in truancy and evenings out may be consequences, more than causes, of the recent downward trend in marijuana use.)

CONCLUSIONS

Our purpose in this paper is to reach a better understanding of the recent decline in marijuana use. Using data from 11 annual surveys of high

school seniors (1976–1986), we have explored two possible explanations for the decline in marijuana use from 1979 through 1986.

First we considered whether young people have become more “conservative” and less “trouble-prone” in general, and whether any such changes were sufficient to account for the decline in marijuana use. Our analysis confirmed the importance of a variety of lifestyle factors; together these factors can account for fully 25 percent of the variance in marijuana use. Moreover, some dimensions show trends consistent with the decline in marijuana use: truancy and frequency of evenings away from home have declined slightly during the 1980s. On the other hand, religious commitment also has declined slightly during the 1980s, a shift opposite to what we would expect to reduce marijuana use. More important, both bivariate and multivariate analyses show that controlling for these lifestyle factors has little or no impact on the secular trend in marijuana use. Thus we conclude that although individual differences in lifestyle are very important in understanding individual variations in marijuana use, the data offer no support for the proposition that any sort of overall conservative shift underlies the recent decline in marijuana use.

Then we considered whether there have been specific changes in views about marijuana and its risks, and whether any such changes were sufficient to account for the decline in marijuana use. We showed that both perceived risks and personal disapproval of marijuana use, especially regular use, have risen sharply since 1978. Moreover, both the bivariate and the multivariate analyses indicate that in the presence of controls either for perception of risks or for disapproval, the recent secular trend in marijuana use disappears. Thus the data suggest strongly that if there had not been a distinct increase in negative attitudes about marijuana, we would not have found steadily lower levels of marijuana use in each succeeding class of high school seniors since 1979.

In this analysis we chose to focus on two dimensions which we consider especially important and revealing, but we noted also that other dimensions show somewhat parallel trends: increased proportions of seniors these days perceive that their friends disapprove of marijuana use, and fewer perceive that their friends use marijuana (Johnston 1985; Johnston et al.

1987). Although such analyses lie beyond the scope of the present paper, we are confident that analyses of these other measures would have produced results similar to those we found for perceived risks and disapproval, though perhaps not quite as strong.

Some additional findings from the regression analyses (Table 4) will round out our understanding of interrelationships among lifestyle factors, attitudes, marijuana use in general, and secular trends in use. Lifestyle factors largely overlap attitudes, especially disapproval, in predicting drug use. In our discussion thus far we have stressed that disapproval shifted substantially during the 1980s, while lifestyle factors changed rather little; nevertheless, it is also true that some of the lifestyle factors have been correlated strongly with disapproval of marijuana use throughout the last decade. Thus it seems useful to conceive of disapproval in part as an intervening variable through which lifestyle factors exert some of their effect upon marijuana use.

Carrying the above ideas a step further, we believe that the following are the dominant, but not exclusive, directions of causation among the dimensions we have been examining: 1) disapproval has a direct effect on marijuana use; 2) lifestyle factors have direct effects on marijuana use, as well as indirect effects via disapproval; 3) perceptions of risk have direct effects on marijuana use, as well as indirect effects via disapproval.⁸ Moving beyond the boundaries of the present analysis, we believe also that changes in the social environment, primarily changes in information about marijuana, have led to a secular trend in perceptions of risk, which has led in turn to secular trends in disapproval and in actual marijuana use.

The interpretation offered above, we believe, is consistent with the data reported in this paper, as well as with other analyses based on this data set. We have not, however, presented this interpretation as a formal model to be estimated, partly because of limitations in the data set but also because of a fundamental appreciation of the difficulties in sorting out some causal issues involving drug use. As an example, consider whether frequent evenings away from home “cause” higher marijuana use, or the reverse. For some individuals, being away from home in the evening may be a completely necessary condition for marijuana use, and thus an

essential ingredient in the causal chain. The causal chain is complex, however, because often an evening out may be undertaken specifically in order to smoke marijuana, and thus is "caused" by the intention or desire to use marijuana. For other individuals, however, being out for an evening-prompted by considerations other than an interest in **marijuana**—sometimes may lead to (help to cause) the use of marijuana. We may really be illustrating the futility of trying at this individual level to sort out causal patterns in any definitive sense. We can make useful conceptual distinctions between behavioral intentions and actual behaviors, and we can consider whether individual attitudes about marijuana precede or follow (or both) individual behaviors and intentions, but trying to allocate portions of correlations to one or another of these causal pathways seems an intractable problem—certainly with our present data, and quite possibly with any other sort of survey data.

In the present paper we are not trying to seek any definitive settlement of the alternative causal interpretations illustrated above; we simply wish to take these possibilities into account as we focus on the more limited task of understanding recent trends (not necessarily individual changes) in marijuana use. Here, we believe, we have some chance of grasping what has contributed to a reduction in the use of one drug; we may even be able to generate some useful ideas about what might affect future use of other drugs.

Our analysis has illustrated that when we look either at perceived risks or at disapproval, we can "account for" the decline in use in some important sense. We think that much the same would be true if we conducted similar analyses involving some of the other trending dimensions. We remain uncertain, however, about which of these factors may be most **important**—or, more to the point, which factors might be "movable" or "influenceable" and in turn might play a part in influencing other such factors and eventually influencing individual behavior. Here we must consider not only the data but also our conceptualizations of how the several factors in the social environment interact to help shape individual attitudes and intentions regarding marijuana.

Our own view is that the shifting views about risks are a fundamental factor, influencing individuals' own disapproval, the disapproval

they convey to others, and the disapproval that others convey to them. These kinds of changes would contribute to declining use by individuals, by their friends, and by their wider circles of acquaintances. In this scenario, then, the perceptions of greater risks "got the ball rolling" and provided the basis for increased personal disapproval and decreased (perceived) use by friends and acquaintances with each succeeding class of seniors since 1979.

Jessor (1985: 258), commenting on the "conventional wisdom" about efforts to reduce drug use, stated that "... the consensus among most researchers is that information alone is not effective in influencing behavior, and that negative information or 'scare tactics' are especially ineffective." We can understand how that conventional view may have arisen. Early efforts to dissuade students from use of marijuana often made exaggerated claims about harmful effects; meanwhile, students could observe readily that friends and acquaintances who used marijuana did not suffer such disastrous consequences. More recently, however, reports about the health consequences have been more balanced, have received better and more extensive media coverage, and have been based on much more extensive research. Similarly, reports about psychological consequences such as poor school performance, reduced interest in extracurricular activities, and impaired interpersonal relationships have now acquired the ring of truth: regular use of marijuana (and other drugs) has been widespread for a long enough time to give most students first-hand contact with at least a few classmates who fit the popular description of "burnout." Indeed, we have found that daily marijuana users themselves perceive some such consequences as stemming from their use of the drug (Johnston 198 1). Thus it seems that direct observation, and the resulting vicarious learning, have become consonant in recent years with messages from "the system."

For those concerned with prevention, then, we think that at least two conclusions can be drawn from research linking attitudes toward drugs to actual drug use. First, scare tactics are not likely to work, particularly when contradicted by personal experiences. On the other hand, realistic information about risks and consequences of drug use, communicated by a credible source, can be persuasive and can play an important role in reducing demand, which

ultimately must be the most effective means of reducing **drug** use.

NOTES

1. **The** measures of perceived risk and disapproval appear in separate questionnaire forms, each as part of a larger set of questions asking about a variety of drugs. A small proportion of respondents each year respond in "straight-line" fashion to these item sets. On the one hand, a few respondents indicate that any use, even once or twice, of any of the drugs on the list involves "great risk" of harm; we suspect that such individuals are responding carelessly, while others really hold such strong views. On the other hand, when a respondent selects one of the less extreme ratings ("moderate risk," "slight risk," or "no risk") and applies that rating indiscriminately to all the drug-use behaviors listed (behaviors as disparate as regular heroin use and trying marijuana once or twice), we consider that the respondent is being careless and/or fails to understand the question. We take a similar view of any respondent who applies the same "don't disapprove" or "disapprove" (rather than "strongly disapprove") rating to all the drug-use behaviors in the question set. Accordingly, for all analyses in this paper involving perceived risks or disapproval, we deleted all respondents whose ratings failed to make any differentiation among drugs and levels of use, except for those who consistently indicated strong disapproval or great risk. (See Herzog and **Bachman** 1981 for a discussion of straight-line responding in questionnaires of the type used here.) We also deleted from these analyses any respondent who provided "inconsistent" answers for any of the drugs, such as no risk in smoking marijuana regularly but slight, moderate, or great risk in trying marijuana or using it occasionally. These deletions of what we judged to be "careless" responders had about the same effect for each of the 11 surveys included in this analysis; sample sizes for the disapproval items were reduced by about four or five percent, while for the perceived risk items they were reduced by three or four percent. Also deleted, of course, were respondents who failed to answer the item (about one percent of the sample for each item), as well as those who chose the "can't say, drug unfamiliar" response to the question on perceived risk of regular marijuana use (about three percent of the sample).
 2. We use the term "predictor" as a matter of convenience and because it is the familiar term used in the regression analyses that follow. We do not wish to imply, however, that a single direction of causation is assumed. Indeed, in some cases we note the possibilities for reciprocal causation.
 3. In addition to omitting background factors, the present analyses omit three lifestyle variables that appeared in our earlier analyses but were largely redundant with other predictors: curriculum (college preparatory) and college plans were omitted because they overlapped with two other stronger educational predictors, grades and truancy; frequency of dating was omitted because it added almost no predictive power beyond that provided by the measure of evenings out for recreation.
- The resulting smaller set of lifestyle and experience predictors used in the present analyses yields a multiple correlation coefficient of about .50 predicting marijuana use; if all the omitted predictors were included, the coefficient would increase only to about .51.
4. Product-moment correlations, which reflect linear relationship, are shown in the table, but we also calculated eta coefficients and compared them with the product-moment coefficients to ascertain whether nonlinear relationships were present. In all cases the two coefficients were virtually identical, indicating that relationships are almost completely linear. Thus we conclude that our use of linear regression in the later stages of this analysis is appropriate.
 5. Table 3 gives some indication that seniors in the mid-1980s who perceived "no risk" in regular marijuana use averaged lower levels of actual use than did their counterparts in the late 1970s or early 1980s. We do not consider this finding to be a genuine trend, for two reasons. First, the numbers of cases in this row are so small in the mid-1980s that the sampling errors for the means become rather large. The "no risk" row in Table 3 includes 12 or 13 percent of the total sample in the years 1976 through 78, but only 1.2 percent of the 1986 sample (about 36 cases). A second and more important consideration concerns the problem of careless responders, noted in the "methods" section of this paper. A surprisingly consistent number of individuals each year (ranging from 91 to 127) were screened out as having responded carelessly to the questions about risks; of these, about 30 each year would have been included in the "no risk" row of Table 3. Indeed, our failure to exclude these respondents in earlier versions of the table resulted in some distortion of the data for the 1970s, but much more severe distortion of the data for the mid-1980s (when they constituted one-third or more of the cases). We cannot assume that our present fairly limited screening has succeeded in weeding out all careless responders; therefore we suspect that some distortion may remain and that its effects are more serious in the "no risk" row of the table, where the small numbers of cases result in an especially troublesome "signal to noise ratio." (Incidentally, in Figure 2 we deal with this problem by combining the "no risk" and the "slight risk" categories.)
 6. An alternative approach would be to use year of graduation as our measure of the secular trend. If such trends in marijuana use and attitudes had been linear or nearly so (as they have been since 1979), we could have treated year of graduation as a single continuous variable; however, the **curvilinearity** of trends during the total period from 1976 through 1986 would require the use of a series of dummy variables, one for each year. We prefer the present approach not only because of its relative simplicity for computation and interpretation, but also because it focuses specifically on the secular trend in marijuana use.
 7. We place the term "explained" in quotation marks as a reminder of the arbitrary aspects of such regression analyses. We recognize that one could undertake instead to "explain" perceived risk or disapproval by treating marijuana use as the predictor. However, it would *not* be possible to reverse the analyses either in Table 3 or in Table 4 and fully "account for" the secular trends in perceived risks or disapproval by

including individual marijuana use as a predictor (see Bachman et al. 1986).
8. We could not compute correlations between the perceived risk and the disapproval measures using the annual surveys of seniors, because the two sets of

measures appear in different questionnaire forms. Both measures, however, were included in a special sample of about 1,000 seniors surveyed in 1979; consistent with the interpretation offered here, the two were correlated strongly ($r = .53$).

APPENDIX. Correlation Matrices

Matrix Based on Questionnaire Form 5										
	1	2	3	4	5	6	7	8	9	10
1. Annual marijuana use (1-7 scale)<										
2. Grades	-.2019									
3. Truancy	.3628	-.2130								
4. Hours worked per week	.1281	-.0628	.1219							
5. Average weekly income	.1227	-.0629	.1262	.6560						
6. Religious commitment	-.2563	.1444	-.1951	-.0786	-.0797					
7. Political beliefs	.1743	-.0366	.1080	.0098	.0260	-.1482				
8. Evenings out per week	.3213	-.1157	.2361	.0451	.1214	-.1026	.0700			
9. Sex (M= 1, F= 2)	-.1117	.1512	-.0721	-.1022	-.1090	.1286	.0053	-.0937		
10. Perceived risk of regular marijuana use	-.5741	.1397	-.2716	-.0832	-.0492	.2334	-.1590	-.2369	.1034	
11. Mean marijuana use per year	.1246	.0159	.0551	.0332	-.0727	.0287	.0148	.0472	-.0081	-.2848

Matrix Based on Questionnaire Form 3										
	1	2	3	4	5	6	7	8	9	10
1. Annual marijuana use (1-7 scale)<										
2. Grades	-.2057									
3. Truancy	.3617	-.2124								
4. Hours worked per week	.1173	-.0709	.1162							
5. Average weekly income	.1313	-.0655	.1237	.6476						
6. Religious commitment	-.2689	.1503	-.1807	-.0734	-.0756					
7. Political beliefs	.1701	-.0370	.1233	.0267	.0181	-.1554				
8. Evenings out per week	.3150	-.1193	.2345	.0412	.1161	-.0822	.0856			
9. Sex (M= 1, F= 2)	-.1140	.1558	-.0757	-.1013	-.1062	.1304	-.0101	-.1001		
10. Disapproval of regular marijuana use	-.6773	.1819	-.2988	-.0908	-.0829	.2918	-.1887	-.2679	.0965	
11. Mean marijuana use per year	.1204	.0162	.0543	.0479	-.0695	.0319	.0181	.0484	.0023	-.1992

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