

Socialization into Marijuana Use among French Adolescents: A Cross-Cultural Comparison with the United States

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Correlates and predictors of marijuana use among French adolescents are described and compared to correlates among adolescents in the United States. Although prevalence of marijuana use is much lower among the French than among the Americans, within each country, adolescent marijuana use is governed by similar socio-psychological processes. Peer influences are the strongest predictors of marijuana use, especially in terms of modeling effects, and are consistently stronger than parental influences. The modeling effect of peers is consistently stronger in the United States than in France. Alcohol use, a stage of drug involvement preceding marijuana use, has only an indirect effect on marijuana involvement.

Numerous studies have described the attributes of youths in the United States who use marijuana as contrasted to those who do not use the drug. Between these two groups, differences in values and lifestyles are much greater than are differences in sociodemographic characteristics. As compared to nonusers, marijuana users tend to be more involved with their peers, to espouse a more liberal political ideology, to be less interested in their school work, and to have participated in a variety of mildly deviant activities (Bachman et al., 1981a) Jessor and Jessor, 1977; Kandel et al., 1976; Smith and Fogg, 1978). Despite the rapid increase in prevalence of marijuana use observed in the United States over the last decade, these characteristics among users have remained more or less the same. The users in 1980 showed the same patterns of 'disaffection from major institutions as did the users in 1967

(Suchman, 1968); and the social-psychology of marijuana use is very much the same it was 10 years ago (Bachman et al., 1981b; Jessor et al., 1980; Kandel, 1982). Similar patterns may occur in other countries, although rates of marijuana use reported to date on samples from outside the United States have been too low to isolate specifically the characteristics of youths using marijuana, except in Canada (Hundleby, 1979; Sadava and Forsyth, 1977; Schlegel, 1975).

In this study, we examined the correlates of marijuana use among adolescents in France, where the rates of use are still much lower than they are in the United States. In 1977, for example, when lifetime prevalence of use among high school seniors in large standard metropolitan areas in the United States was 62 percent (Johnston et al., 1979: p. 49), only half as many (31 percent) in a sample of 18-year-olds in an urban French sample reported lifetime experience with marijuana (Kandel et al., 1981). Despite this difference in the prevalence of use in the two countries, there are similarities in the process of substance involvement. In both countries, developmental sequences for drug use were identified with an identical ordering of four stages: experience with (1) beer and/or wine, (2) distilled spirits and/or cigarettes, (3) marijuana, and (4) other illicit drugs (Adler and Kandel, 1981; Kandel, 1975; Single et al., 1974). The question of inter-

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est was to determine the extent to which the correlates of marijuana use are similar or dissimilar in the two countries.

The theoretical perspective underlying our investigation was that of socialization theory. The importance of interpersonal factors, and especially of peer influences, on marijuana-use by adolescents constitutes one of the best replicated findings in drug research (Akers et al., 1979; Brook et al., 1977; Burkett, 1977; Ginsberg and Greenley, 1978; Huba and Bentler, 1980; Huba et al., 1979; Jessor and Jessor, 1977; Kandel, 1974; Kandel et al., 1978a; reviews by Glynn, 1981; Jessor, 1979; Kandel, 1980). The role of parents and of peers on marijuana use by adolescents is of special interest to students of adolescent development. Indeed, some view adolescence as a period in which adolescents gradually become detached from their parents (Bowerman and Kinch, 1959; Floyd and South, 1972), their movement toward the peer group resulting in the rejection of parental values (Coleman, 1961; Mead, 1970) and the adoption of delinquent behaviors (Cohen, 1955; Hirschi, 1969). Still others believe that the two sets of values represented by parents and peers are not necessarily incompatible with one another, and that adolescents may be simultaneously influenced by both groups and need not be in conflict with their parents (Biddle et al., 1980; Curtis, 1974; Kandel and Lesser, 1972; Offer, 1969; Offer et al., 1981; Troll and Bengtson, 1979). Indeed, certain interpretations of youthful marijuana use propose that youths from families in which the parents consume alcohol, tobacco, or medically prescribed psychoactive substances may be at greater risk for marijuana involvement than are youths from families in which parents consume no substance. As noted earlier, parental and especially peer effects have been documented with respect to the use of marijuana by adolescents in the United States. Thus, in examining factors related to adolescent marijuana use in these cross-cultural comparisons between France and the United States, we have concentrated on the potential influences that stem from the adolescent's matrix of social interactions not only with parents, but also with peers.

Social learning theory (Akers et al., 1979; Bandura, 1977) provides a useful concep-

tualization for considering sources and modes of interpersonal influence. Two processes describe the modes of potential socialization influences of parents and of peers on adolescents. Through imitation, youths model their own behaviors on others' behaviors by simply observing and replicating the behaviors. Through social reinforcement, adolescents may internalize definitions favorable to specific behaviors and may exhibit behaviors and values approved by significant others. An additional process, derived from the notion of commitment in the control theory of delinquency (Hirschi, 1969), applies only to parental influence: the quality of the parent-child bond is assumed to have a restraining effect on involvement in deviant activities, irrespective of the parental behaviors and values (McCord and McCord, 1959; Hirschi, 1969; Zucker, 1979). Thus, within each of parental and peer influences, three types of variables reflect various potential modes of socialization: (1) actual behavior with respect to marijuana use; (2) attitudes held with respect to marijuana and to marijuana use; and (3) the quality of interactions. The first two variables assess the respective roles of parents, and of peers either as sources of imitation or as stimuli for social learning for the individual adolescent. The third class of variables taps the more qualitative features of the interactions between adolescents and their significant others. While imitation and value internalization represent direct effects of significant others, there are also potential indirect effects when the direct effects are on the child's values or nondrug behaviors, those in turn determining specifically the use of a particular drug.

In addition to interpersonal influences, we consider other domains of variables pertaining to the individual's intrapersonal attributes, including sociodemographic, personality, and behavioral characteristics. We address two major questions: (1) What is the relative importance of each domain of variable in predicting marijuana involvement by adolescents in France and in the United States? (2) What is the respective importance of parents and of peers as role models, and how do these interpersonal influences interrelate? These questions need be considered within the developmental context of adolescent drug involve-

ment in which marijuana constitutes a stage subsequent to the use of alcohol or tobacco, or both (Kandel, 1975).

METHOD

Samples and Field Procedures

The data on the French sample derive from a household survey in urban adolescents in France. Comparative data are from an earlier high school study performed in the United States.

The French sample includes 499 adolescents representative of 14- through 18-year-old youths in the Parisian metropolitan area (Paris and suburbs) who were interviewed in Spring 1977. The field work was performed by the Institut Français d'Opinion Publique. The quota sample was based on respondents' age, sex, and student status. Data were collected with a structured interview schedule administered in households. The schedule was based on an instrument developed for the earlier United States high school study (Kandel et al., 1976), with translation and back-translation to ensure comparability across cultures. Efforts were made to include identical questions in the instruments, although modifications were introduced to incorporate country-specific conditions. Pretests of 18 interviews were performed.

In addition to the French results, cross-sectional data are presented from the first phase of a longitudinal study of a representative sample of students ($N=8,206$) in New York State high schools who were surveyed in their classrooms in the Fall of 1971 (for a detailed description of the sample and the self-administered questionnaire, see Kandel et al., 1976, 1978a). The cross-sectional United States data reported here have not been published previously.

Both samples are almost equally distributed in regard to sex (53 percent males in the French and 45 percent in the United States samples). The age distributions differ, however, the French sample significantly older than the American; the proportion of adolescents 18 years old or over is 26 percent in the French versus 4 percent in the United States sample.

Age, however, is associated with drug use and a number of its potential predictors. Prevalence of use increases with age throughout adolescence (Kandel, 1980), as does orientation toward peers, whereas orientation toward parents decreases (Adler and Kandel, 1981). In order to control for possible effects of age on the results, all analyses were run on age-adjusted samples, with the French sample standardized on the age distribution of the United States sample.

Populations at Risk

The identification of stages in drug use has important implications regarding the proper subsamples to consider in any analysis of the factors that predict, differentiate, or result from the use of a particular drug. Each stage represents a cumulative pattern of use and generally contains fewer adolescents than the preceding stage in the sequence. Therefore, unless appropriate procedures are followed, the attributes identified as apparent characteristics of a particular class of drug users may actually reflect characteristics for involvement in drugs at the preceding level.

This problem can be managed by two strategies: (1) the introduction of explicit terms referring to the use of substances from a prior stage into the prediction equation; and (2) restricting the analysis to the restricted subsamples of respondents who have already used drugs(s) at the previous stage (Kandel et al., 1978b). Both strategies were employed in our analyses. A restricted subsample conforms to the epidemiological notion of a population at risk. Given the evidence for stages in drug use, an adolescent who has not used alcohol is not exposed to the risk of using marijuana. Since the prediction of marijuana use for youths who are not exposed to the relevant risk is not substantively meaningful, persons who are not exposed to this risk are deleted from the analysis, the use of prior drugs being thus kept constant in the sample. Any effects that are identified cannot be attributed to indirect effects through the use of drugs in the previous stages.

Consistent with previously published longitudinal American analyses, the sample at risk for marijuana includes adolescents who

have used alcohol, tobacco, or both, three or more times (Kandel et al., 1978a). This restriction was applied only to the American sample, as 96% of the French sample had used at least one alcoholic beverage or smoked cigarettes on three or more occasions. Thirty-five percent of the American males and 38 percent of the females were eliminated in the restricted sample. In the French sample, 21 percent of the adolescents had used marijuana; in the United States group, 42 percent of the sample of legal drug users reported to have used marijuana.

Independent Variables

The predictor variables were classified into five conceptual clusters.

Demographic variables-including respondent's age, father's education, and a set of dummy variables to describe the type of school attended (academic and vocational schools in France; academic, vocational and general schools in the United States).

Behaviors-including variables measuring the respondent's extent of involvement in school-related activities (amount of time spent on homework, number of days absent from school), school performance, and frequency of attendance at religious services.

Attitudes-including marijuana-related attitudes (occasional or regular use of marijuana might cause harm), educational aspirations, political attitudes (ranging from radical to conservative), and depressive mood.

Peer variables-including number of friends using marijuana, an index of peer activity based on reported number of activities carried out with peers, degree of peer orientation, reasons for marijuana use being either to get along with friends or to enjoy with friends, and talking to friends about drugs. (The latter was available only in the United States.)

Parental variables-including parental use of beer, wine (combined in the United States), and distilled spirits (liquor), existence of parental rules regarding marijuana use, reason for not using marijuana being parental disapproval of alcohol use, and closeness to father and to mother.

A total of 33 variables were included in the analyses. Most were single-item variables. In-

dices were developed to measure depressive mood, extent of peer activities, degree of peer orientation, the existence of parental rules regarding drug use and closeness to father and to mother.

It is important to keep in mind that the measures of interpersonal influence are perceptual, as the data on significant others were not obtained independently from parents and peers but from the adolescents.

Dependent Variable*

Respondents were asked how often they had ever used marijuana in their lives, and how often they had done so in the 30 days preceding the survey. A three-category variable was created that classified respondents according to whether they had never used marijuana, had used it some time in their lives but not during the past month, or had used it during the past month. The self-reported number of marijuana users in the French sample was not large enough to make possible a more refined distinction with respect to degree of use, especially since the analyses were carried out among boys and girls separately.

Analytical Strategies

Two alternate multivariate analytical strategies were pursued: (1) regression analyses to provide estimates of the effects of clusters of variables on adolescent marijuana use; (2) causal models to investigate the structure of interpersonal influences on marijuana use.

The first phase of the multivariate analysis involved determining the effects of single clusters of variables. The American sample was restricted to adolescents who had already used a legal drug, alcohol, and/or tobacco. A high degree of multicollinearity¹ was observed among individual items within and across the conceptual variable clusters. This yielded high standard errors of estimate for individual regression coefficients and obviated a meaningful interpretation of the effects of individual variables. Therefore, most of the analyses were limited to the effects of clusters on the dependent variable. The dependent variables were regressed on the items in each cluster sepa-

rately to provide estimates of the total effect of a cluster. To obtain measures of the unique effects of each cluster, an additional series of regressions were run with all five clusters; each cluster in turn was added last to the list of regressors. The increment in R^2 attributable to each particular cluster, calculated as the differences in R^2 between the total regression and the regression in which the cluster was omitted, was interpreted as a direct effect of the given cluster on marijuana use.

A second phase of the analysis involved examining in greater detail the structure of effects involved in the imitation of significant others, parents and peers. A causal model was tested on the total nonrestricted samples in which parental and peer alcohol use were assumed to precede both adolescent and peer marijuana use, and in which peers mediated between parental alcohol use and marijuana use by the focal adolescent. Based on Jöreskog's LISREL program (Jöreskog and Sörbom, 1979), the effects of variables were estimated net of measurement errors. A detailed specification of the model is described shortly.

RESULTS

Within the context of cross-cultural differences in the activities and values of French and American youths, of which prevalence of marijuana use is an example, marijuana use itself is associated with similar characteristics in each country. The association increases in direct proportion to the extent of marijuana use (Table 1). Users are less likely to attend religious services, and much more likely than nonusers to be absent from school, to hold favorable attitudes toward marijuana, to be distant from their parents, and to be oriented toward their peers rather than toward their parents. The percentage differences are larger in France than in the United States.

To obtain more precise estimates of the correlates of marijuana use in each country, multivariate analyses were carried out. Table 2 shows the results of regression analyses pertaining to the total and unique effects of the five conceptual clusters on the three-category dependent marijuana use variable. The difference between total and unique effects (which can be calculated from the data pre-

sented in Table 2) can be interpreted as the indirect effect of a given cluster on the dependent variable. Since at this stage of the analyses we assumed no causal ordering among the conceptual clusters, this indirect effect is not interpreted in causal terms.

The overall configuration of results is very similar in the two countries. The explanatory power of the variables is high in both countries, with at least 60 percent of the variance in marijuana use explained.² The same two clusters in each country have the strongest effects: peer variables and drug-related attitudes. Comparison of total and unique effects indicates that most of the variance accounted for by the various clusters is overlapping. In every case, the total effect attributed to any given cluster is at least three times as large as the unique effect, and in most instances it is several times as large. Thus, much of the total variance accounted for by a given cluster is not uniquely attributable to that cluster, but is also shared with other clusters. Because of the size of the United States sample, most clusters have a statistically significant effect.

In both countries, the peer cluster is the most powerful by far of the five domains of variables included in the analyses. The difference in the size of the effect of this cluster in comparison with the others is somewhat greater, however, in the United States than in France. The peer cluster by itself explains 14 to 18 percent of the variance of marijuana use in France, and 20 to 21 percent in the United States.

The next most important cluster in both countries is that of attitudes. Own attitudes account for 2 to 3 percent in the United States sample and 5 to 6 percent in the French. In the United States sample, none of the other unique effects reach 1 percent, although because of the large sample size, they are statistically significant, with the exception of the demographic cluster among males. The parental cluster in the French group has a significant effect only among males, and is relatively stronger than in the United States group for both sexes. The demographic cluster has a statistically significant effect among French adolescent males.

The rationale for restricting the analysis of marijuana use to the sample of respondents who had used alcohol and/or tobacco has been

TABLE 1. Characteristics of Adolescents in France and the United States by Frequency of Lifetime Marijuana Use

Percent of Adolescents Who:	Lifetime Marijuana Use				All Adolescents (%)
	Never (%)	1-2 Times (%)	3-39 Times (%)	40+ Times (%)	
Feel extremely, quite close to mother					
France	57	52	35	38	54
U.S.	67	59	50	47	63
Feel extremely, quite close to father					
France	47	23	15	0	41
U.S.	56	47	42	35	51
Would continue seeing friends if parents objected					
France	43	68	92	92	68
U.S.	46	65	71	79	54
Respect friends' opinions much more than parents'					
France	4	7	20	38	7
U.S.	6	11	15	18	9
Attend religious services never/rarely					
France	77	88	97	79	80
U.S.	42	54	65	77	49
Study 1½ hour or more					
France	46	34	22	9	42
U.S.	37	26	20	15	32
Missed 15+ days of school					
France	9	13	25	55	12
U.S.	10	19	25	41	15
Believe occasional use of marijuana is harmful					
France	50	15	13	0	43
U.S.	32	7	3	3	24
Number of friends who use marijuana (most, all)					
France	3	15	46	86	10
U.S.	25	16	44	95	20
Report that parents forbid use of marijuana					
France	83	79	48	46	78
U.S.	81	74	77	60	78
TOTAL N					
France ≥	327	30	42	17	416
U.S. ≥	4,310	472	928	680	6,390

mentioned. In the next section, however, causal models are presented in which marijuana use is related to the use of alcohol and that are necessarily based on the total unrestricted samples. To assure comparability between these two parts of the analysis, the regressions in the United States data discussed above were rerun on the total unselected sample. The results pertaining to the total and unique effects of clusters were virtually identical to those obtained for the restricted samples.³ The mean of the absolute value of the difference between the total effects estimated

by the two methods is .025; the mean of the -absolute value of the differences in the unique effects is .002. The lack of difference implies that adolescent alcohol use does not have a direct effect on marijuana use. This is specifically tested and documented in the causal model.

To further specify these findings, additional regressions were estimated for the unselected samples, in which alcohol use was introduced as a predictor in the regressions, in addition to the five conceptual clusters. The introduction of alcohol use into the equations had a negligible

TABLE 2. Total and Unique Contributions of Five Conceptual Clusters to Explained Variance of Adolescent Marijuana Use by Sex in France and the United States

Cluster	France		United States ^a	
	Total	Unique	Total	Unique
Males				
Demographic	.098	.022*	.023	.001
Behaviors	.066	.007	.095	.003**
Attitudes	.416	.060**	.366	.035**
Peers	.564	.179**	.568	.210**
Parents	.155	.022*	.059	.001**
Total explained R ²		.679		.612
Females				
Demographic	.021	.007	.029	.005**
Behaviors	.093	.011	.112	.008**
Attitudes	.328	.049**	.346	.026**
Peers	.486	.144**	.562	.201**
Parents	.255	.031	.058	.004**
Total explained R ²		.586		.607

^a Restricted sample.* Significant $p < .05$.** Significant $p < .01$.

ble effect on the R²'s in all the regressions, indicating that alcohol use makes no unique contribution to the use of marijuana. The effects of alcohol use on marijuana use are mediated by the variables that are intermediary in the causal sequence between use of alcohol and marijuana use. Alcohol use by itself cannot be considered a directly caused factor even if it is conceived to be a necessary condition for the use of marijuana (and other illicit substances), as is implied by the notion of stages in drug behavior.

Despite certain differences, the overall pattern of results is similar in both countries. Peers emerge as the most important influence on adolescent marijuana use. The adolescent individual characteristics are relatively unimportant, except for favorable attitudes toward marijuana.

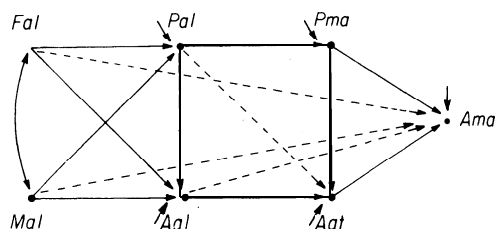
Causal Models for Marijuana Use

Having documented the pivotal role of peers on marijuana use by adolescents, a causal model was tested in order to elucidate the process of marijuana use and of the potential role of parental drinking as an earlier factor in the process of drug involvement. Indeed, parents

could have indirect effects that would not be revealed by the regression analyses. For example, they could have an effect on their children's drinking, the latter, in turn, having an effect on marijuana involvement.

The model (Fig. 1) examines the direct and indirect effects of parents and peers as role models for marijuana use and as important sources of influence in the formation of attitudes favorable to marijuana. The model introduces explicitly the notion of stages in drug use by including adolescent and peer use of alcohol as endogenous variables. Alcohol use by father and mother are exogenous variables that are assumed to be correlated with each other, although this correlation is not interpreted causally. Parents are assumed to have a direct effect not only on their children's use of alcohol and of marijuana through a process of imitation, but also on alcohol use by the adolescent's friends. The statistical effect of parents on peers is interpreted as the effect that parental alcohol use has on the selection of friends by their son or daughter (Adler and Kandel, 1981).

Peers' alcohol use is presumed to be a direct cause of peers' marijuana use, as well as of the focal adolescent's own alcohol use and attitudes regarding marijuana, but only an indirect cause of the focal adolescent's actual marijuana use. Peer marijuana use is assumed to affect the adolescent's attitudes about marijuana as well as actual use of marijuana. The focal adolescent's consumption of alcohol is assumed to have a direct effect on own attitudes regarding the use of marijuana as well as

FIGURE 1. Causal Model of Interpersonal Influences On Marijuana Use

Fal: Father's alcohol use; Mal: Mother's alcohol use; Pal: Peers' alcohol use; Aal: Adolescent's alcohol use; Pma: Peers' marijuana use; Aat: Adolescent's marijuana attitudes; Ama: Adolescent's marijuana use. Broken line indicates paths tested and found to be nonsignificant.

the actual use of marijuana. The focal adolescent's attitude regarding the use of marijuana is also presumed to be a direct cause of own marijuana use.

In this model, certain direct effects are specifically assumed to be absent. Parental alcohol use is assumed to have a direct effect on the use of alcohol by both the offspring and his or her peers and on the use of marijuana by the offspring, but no direct effects on the peers' use of marijuana and the adolescent's marijuana-related attitudes. In addition, in the absence of independent data from friends, a probable reciprocal path of influence between the focal adolescent and his peers is not tested. Since no attitudes are reported for peers, a symmetrical model in which the focal adolescent's alcohol use would have affected peer's attitudes regarding marijuana use cannot be constructed.

The model was estimated through LISREL, Jöreskog's general model for the analysis of covariance matrices (Jöreskog and Sörbom, 1979). The structural model includes measurement models for certain variables. Parental and own alcohol use are considered unmeasured variables with the following indicators: use of beer, wine (these two indicators measured by a single item in the United States sample), and hard liquor (distilled spirits). The focal adolescent's marijuana-related attitude is considered a single underlying variable measured by three indicators: the belief that marijuana use should be legalized, the belief that casual use of marijuana may be harmful for the user, and the belief that regular use of marijuana might be harmful. Only one indicator each was available for the following variables: alcohol use by peers, marijuana use by peers and marijuana use by the focal adolescent, and each was assumed to be an infallible measure of the respective underlying variable.

Since the focus of the present analysis is on the structural relationships among the variables and not on their measurement properties, the estimation was carried out in two stages. In the first, an unconstrained model was constructed in which all latent variables were intercorrelated. This model incorporated the measurement assumptions described above and was used to estimate the covariance matrix of the latent variables. In the second stage, this covariance matrix was used for estimating pa-

rameters in the structural model, which relates the latent variables to one another. All models were estimated separately for males and females in the two countries.

Because of the large disparity in the sizes of the two samples (approximately 500 cases in the French and 8,200 in the United States samples), certain effects might be significant in the United States but not in France simply because of this discrepancy in size. Similarly, every cross-cultural comparison is likely to yield statistically significant differences. To counteract such possible effects, the American sample was weighted down to be similar to the French one, and to equal 250 observations each for males and for females.

Because alcohol use is entered as a specific term in the model, it cannot be used as a sample selection criterion without adversely affecting the variance of this variable. Thus, the analysis is based on the total sample, unselected for the use of any substances.

After estimating the structural coefficients in the model specified earlier, four direct effects were found not to be significant in any of the four subsamples: paternal and maternal alcohol use on the adolescents' marijuana use, peers' alcohol use on the adolescent's marijuana-related attitudes, and the focal adolescent's alcohol use on own marijuana use. These direct paths were deleted from the final version of the model. Parameter estimates for the final model by country and by sex are presented in Table 3.

One major cross-cultural difference is seen with respect to parental effects on peers' alcohol use. Neither effect is significant in the American subsamples, whereas father's effect on peers is significant in both French subsamples, and about equal in size. Cross-cultural differences also appear in the effects of parental alcohol use on their children's alcohol use. Except in the case of French girls, only one parent has a significant and positive effect on drinking by their adolescent children, and with this exception also, adolescents who report that their parents drink are more likely to report drinking themselves. In France, fathers affect their sons and both parents affect their daughters, however, the effect of father's drinking on daughter's drinking is negative. Although the zero-order correlations between French fathers and their daughters' drinking is positive (but small), controlling for maternal

TABLE 3. Standardized and Unstandardized Regression Coefficients in Final Recursive Model (Fig. 1) for Marijuana Use By Sex in France and the United states

Predictors	France					United States				
	Peers' Alcohol Use	Adol. Alcohol Use	Peers' Marijuana Use	Adol. Attitudes	Adol. Marijuana Use	Peers' Alcohol Use	Adol. Alcohol Use	Peers' Marijuana Use	Adol. Attitudes	Adol. Marijuana Use
Unstandardized Coefficients^a										
Males										
Father's alcohol use	.358**	.146**	—	—	a	.090	.040	—	—	a
Mother's alcohol use	.091	-.004	—	—	a	.163	.151*	—	—	a
Peers' alcohol use	—	.206**	.406**	a	—	—	.612*	.536*	a	—
Adol. alcohol use	—	—	—	.169**	a	—	—	—	.145**	a
Peers' marijuana use	—	—	—	.409**	.205**	—	—	—	.374**	.287**
Adol. attitudes	—	—	—	—	.530**	—	—	—	—	.393**
R²	.107	.382	.178	.518	.639	.031	.504	.300	.485	.600
Females										
Father's alcohol use	.382**	-.031*	—	—	a	.095	.094*	—	—	a
Mother's alcohol use	.040	.125**	—	—	a	.149	.042	—	—	a
Peers' alcohol use	—	.137**	.420**	a	—	—	.535**	.549**	a	—
Adol. alcohol use	—	—	—	-.304**	a	—	—	—	.133**	a
Peers' marijuana use	—	—	—	.485**	.183**	—	—	—	.384**	.266**
Adol. attitudes	—	—	—	—	.366**	—	—	—	—	.364**
R²	.093	.569	.237	.425	.499	.037	.530	.315	.522	.568
Standardized Coefficients										
Males										
Father's alcohol use	.287**	.270**	—	—	a	.072	.035	—	—	a
Mother's alcohol use	.150	-.010	—	—	a	.126	.127*	—	—	a
Peers' alcohol use	—	.475**	.422**	a	—	—	.668*	.548*	a	—
Adol. alcohol use	—	—	—	.125**	a	—	—	—	.210**	a
Peers' marijuana use	—	—	—	.671**	.333**	—	—	—	.580**	.447**
Adol. attitudes	—	—	—	—	.527**	—	—	—	—	.395**
R²	.107	.382	.178	.518	.639	.031	.504	.300	.485	.600
Females										
Father's alcohol use	.291**	-.109*	—	—	a	.096	.122*	—	—	a
Mother's alcohol use	.026	.384**	—	—	a	.127	.046	—	—	a
Peers' alcohol use	—	.638**	.486**	a	—	—	.686**	.562**	a	—
Adol. alcohol use	—	—	—	-.114**	a	—	—	—	.173**	a
Peers' marijuana use	—	—	—	.730**	.330**	—	—	—	.628**	.444**
Adol. attitudes	—	—	—	—	.438**	—	—	—	—	.371**
R²	.093	.569	.237	.425	.499	.037	.530	.315	.522	.568

^a Effects tested and found to be nonsignificant.* Significant $p < .05$.** Significant $p < .01$.

and peer drinking, produces a negative regression coefficient. In the United States sample, fathers have significant positive effects on their daughters' drinking, and mothers have significant effects on the sons'. (cf. Adler and Kandel, 1982).

In three of the four subsamples, alcohol use has a positive significant effect on marijuana-related attitudes, indicating that alcohol use predisposes adolescents to acquiring orientations conducive to marijuana use. An exception occurs again among French females, for whom the effect is negative and statistically significant. We consider this an aberrant result that reflects instability in the estimation of the coefficients because of certain features of the data. One feature is the low variance of own alcohol use among French females (.072) as compared with French males (.259). The estimation of effects involving variables with small variances is unstable (Johnston, 1972), as is reflected in the standard error of the estimate. The standard error for the estimate of own alcohol use on marijuana-related attitudes is .128 for French females, as compared with .062 for the French males (both samples being equal in size). The standard error for the estimate of father's effect on his offspring's alcohol use is also much higher in the French female than in the French male sample (.104 versus .068).

The sequence in drug use observed among adolescents is reflected also in the effects of peers' alcohol use on peers' own marijuana use. Large and significant regression coefficients link peers' alcohol use to peers' use of marijuana, and peers' alcohol use to the adolescent's alcohol use. These effects are stronger in the United States than in France. Peers' marijuana use also significantly affects the focal adolescents' marijuana related attitudes, the effects being about equal in the two countries.

Respondents' own attitudes regarding the use of marijuana are affected more strongly by their friends' marijuana use than by their own previous alcohol involvement. The standardized coefficients for peers' marijuana use are at least twice as large as those for own alcohol use in all four subsamples.

The above results describe direct effects of variables in the causal model. To identify the total effects and to specify the major direct and indirect effects of the variables in this model, a decomposition of effects in each sample was performed.⁴ These decompositions, in standardized form, are presented in Table 4. While they recapitulate for direct effects the conclusions just discussed, they provide succinct estimates of total and indirect effects.

The total effect of father's alcohol use on the

TABLE 4. **Decomposition of Standardized Effects of Predictors on Adolescent Marijuana Use in Causal Model By Sex in France and the United States**

Predictors	France		United States	
	Males	Females	Males	Females
Father's Alcohol Use ^a				
Indirect through peers' alcohol use	.092	.083	.031	.041
Indirect through adolescent alcohol use	.018	.005	.003	.008
Total effect	.110	.088	.034	.049
Mother's Alcohol Use ^a				
Indirect through peers' alcohol use	.032	-.007	.054	.054
Indirect through adolescent alcohol use	-.001	-.019	.013	.003
Total effect	.031	-.026	.067	.057
Peers' Alcohol Use ^a				
Indirect through peers' marijuana use	.290	.316	.371	.380
Indirect through adolescent alcohol use	.031	-.032	.055	.044
Total effect	.321	.284	.426	.424
Peers' Marijuana Use				
Direct	.333	.330	.447	.444
Indirect through adolescent attitudes	.354	.320	.229	.233
Total effect	.687	.650	.676	.677
Own Alcohol ^a				
Indirect through adolescent attitudes	.066	-.050	.083	.064
Total effect	.066	-.050	.083	.064

^a No direct effects.

adolescent's marijuana use is twice as large in France as in the United States. Most of that effect is mediated through the father's effect on the selection of peers', and not through an effect on the adolescent's own alcohol use. It will be recalled that the direct effect of both parents on their adolescent's marijuana use was consistently insignificant in all four groups. The total maternal effects on the adolescent's marijuana use are weaker than the total effect attributed to father in France, but the reverse holds true in both American samples.

Peers' alcohol use affects the focal adolescent's use of marijuana indirectly. The total effect of peers' alcohol use is larger among American adolescents than among the French. Most of that effect in all four subsamples is attributed to the indirect effect through the friends' marijuana use rather than to effects through the focal adolescent's own alcohol use.⁵

The total effects of peers' marijuana use in the four subsamples are of approximately equal sizes. Although in the French sample the effects are about evenly distributed between a direct effect on adolescent's marijuana use and an indirect effect through the focal adolescent's attitudes, in the United States sample the direct effect is almost twice as large as the indirect effect.

The effect of own alcohol use is totally indirect in both countries, but is slightly stronger in the United States than in France. The behavioral continuity in substance use from alcohol to marijuana is mediated solely through the effect of alcohol use on marijuana attitudes. (Among French females, this effect is negative, as noted earlier.) These results indicate that, to the extent that a sequence of drug use from alcohol to marijuana exists, it is not the case that the use of the earlier substance directly causes the use of the latter substance. Rather, the use of one substance creates an attitudinal disposition in the user, that in turn, facilitates the use of further substances.

To make overall comparisons between the estimates obtained in different subsamples, models were estimated constraining all structural parameters in the model to be equal in pairs of subsamples, between males and females within each country, and between the two countries within each sex group. The chi square statistics of the constrained models

were compared with the sums of the chi square statistics obtained for each subsample separately. The difference in chi square values tests the hypothesis that all parameters are equal across the two groups compared. Since 10 parameters were being estimated in each model, each of these chi square statistics has 10 degrees of freedom.

All differences were significant, except those between males and females in the United States sample, with a chi square of 5.53 (the critical value is 18.3 for $p < .05$, 23.2 for $p < .01$). As the corresponding chi square for the French sample is 61.84, the equality hypothesis can be rejected for the French sample at $p < .01$. Both within-sex comparisons yielded significant chi square values: 88.23 for males and 142.40 for females, leading to the conclusion that cross-cultural differences exist, even when controlling for sex group.

Decomposing these global differences to discover specific parameters whose values are different in the four groups is complicated because it involves sets of simultaneous tests. Adjusted significance levels were determined by Bonferroni's inequality, in which the nominal significance level is divided by the number of tests to be carried out. Since each global comparison involves 10 parameters, the overall significance level was divided by 10. Reported below are differences found to be significant at $p < .005$, which is equivalent to an overall test significance level of .05.

As expected, no significant differences were found between males and females in the United States sample. In the French sample, differences appeared in the strength of effect of maternal alcohol use on peers (stronger for girls) and on own alcohol use (stronger for boys), and of own alcohol use on own attitudes (stronger for males). In the cross-cultural comparisons, significant differences were found in maternal effects on peers' alcohol use, which were stronger in the United States than in France in the female sample. The effects of peers' alcohol use on own alcohol use were significantly stronger in the United States than in France, both for males and females.

CONCLUSION

Overall levels of involvement in marijuana use are lower among French adolescents than

among adolescents in the United States. Within the context of these divergent contextual patterns of use, however, marijuana users in both countries share similar characteristics. Users are less conforming than nonusers, and are less involved in and committed to various institutions in society, such as family and school. They are also more peer-oriented than are marijuana nonusers. The social processes underlying marijuana use among adolescents are also very similar in the two countries. The convergence in these causal patterns is especially striking, as the cross-cultural data being compared were collected 5 years apart—in 1971–1972 in the United States, and in 1977 in France, when differences probably existed not only in the cultural contexts but also in the historical contexts in which drug behavior is learned and various types of drugs are used.

In both countries, the single most important factor in adolescent marijuana use is use of marijuana by the peer group. Peer-related variables account for a much greater part of the explained variance in marijuana use than any other domain of variables. The next most important variables are attitudes favorable to the use of marijuana. Causal models elucidate the process of sequential involvement in drug use and the process of parental and peer influences in marijuana use. However, the limitations of these data must be kept in mind. Because the data are cross-sectional, and not longitudinal, the associations between variables confound potential consequences with potential causes of drug behavior. Similarly, the measures of significant others are based on reports by the focal adolescent rather than on reports by the sources of influence themselves. As such, the measures are partially determined by the very behaviors they are assumed to explain (Davies and Kandel, 1981). These shortcomings in the data tend to lead to an overestimation of the size of the coefficients. As far as we can ascertain from comparing results obtained from longitudinal data with those from cross-sectional data (Kandel and Margulies, 1976), or self-reports with perceptions (Davies and Kandel, 1981), the patterns of associations among variables do not change.

Except for peer use of marijuana, none of the other variables that were examined, including own alcohol use, has a direct effect on adolescent marijuana use. Parental influences, in the

form of parental use of alcohol, manifest themselves in the choice of friends made by their children. Parents who use alcohol are more likely to have adolescents who form friendships with peers who use alcohol. The peers, in turn, have a twofold influence. A friend who uses alcohol is more likely to start using marijuana himself or herself. It is this very behavior, marijuana use by friends, that has the most important influence on adolescents. In addition, alcohol-using friends have an indirect effect on the focal adolescent in that they facilitate the development of attitudes favorable to marijuana use in that adolescent. These attitudes, in turn, have a strong effect on marijuana involvement. We were interested to find that the adolescent's own alcohol use has no direct effect on marijuana involvement; the effects are indirect, and consist of their influence on the development of favorable attitudes toward the use of marijuana. It is these attitudes that have a direct effect on marijuana involvement.

These results elucidate the role of alcohol in the developmental sequence of drug involvement, in which the use of alcohol and tobacco precedes the use of marijuana, the latter, in turn, preceding the use of other illicit drugs. These developmental sequences have been observed in countries that differ considerably in their patterns of use of legal drugs—countries such as France, which has the second highest rate of alcohol consumption in the world, Israel, which has one of the lowest rates, and the United States, whose rates are in the middle of these extremes. As we have stressed elsewhere (Kandel, 1980), participation at one stage of the sequence puts the adolescent at risk for progression to the next stage; the prior stage is a necessary, although by itself not a sufficient, condition for progression to the next stage. An important conclusion from our analyses is that the use of alcohol, either by an adolescent or by his or her friends, plays no direct causal role in the adolescent's progression to the use of marijuana. The adolescent's own alcohol use, however, facilitates the development of positive attitudes toward the use of illicit drugs. It is these attitudes that, in turn, are strong determinants of subsequent marijuana involvement. Similarly, association with friends who use alcohol increases the chances of marijuana involvement because these friends are them-

selves more likely to start using marijuana and it is marijuana use by the peer group that is the strongest predictor, by far, of own marijuana involvement. Thus, alcohol use, *per se*, cannot be said to be the cause of marijuana use, although it facilitates the development of social networks, on the one hand, and of attitudes, on the other, that are critical to the subsequent processes of involvement in marijuana.

Cross-cultural differences appear in connection with the strength of peer effects. They are somewhat stronger in the United States than in France. In addition, the specific effects of marijuana-using friends are more likely to be direct modeling effects in the United States than in France. In France, the effects are as likely to be indirect, through their effect on the adolescent's marijuana attitudes, as to be direct effects on the adolescent's marijuana use. In both countries, modeling of peers is the single most powerful effect on marijuana involvement. For marijuana, as for alcohol (Adler and Kandel, 1982; Biddle et al., 1980), peers influence each other through modeling.

Thus, while macrolevel cultural factors determine varying prevalence levels of marijuana use across societies, within each setting, adolescent behaviors appear to be governed by similar social-psychological processes. Within each of the cultures studied, peer influences are the strongest predictors of marijuana use, and are consistently stronger than parental influences. However, differences emerge across the two countries in the relative strength of peer effects, the modeling effects being somewhat stronger in the United States than in France.

NOTES

1. The determinant of the correlation matrix among the predictors can be used as a measure of multicollinearity. It attains the value of zero when one variable is dependent on a combination of other variables, the extreme case of collinearity, and the value of 1.0 when all independent variables are uncorrelated. All matrices analyzed have determinants $\leq .001$.
2. The means and standard deviations on the dependent marijuana use variable are: 1.73 (.88) among American males, 1.66 (.86) among American females, 1.38 (.70) among French males, and 1.25 (.60) among French females.
3. The total explained variance in the unrestricted sample is 64 percent for males and 63 percent for females. The unique effects of each cluster are

.00 for demographics, behaviors, and parents among males and females; .03 for attitudes among males and .02 among females; .21 for peers among males and .20 among females.

4. The total effects displayed in Table 4 derive from the causal model and differ from those derived from regression analyses included in Table 2. The differences obtain because (1) the effects in the regression analyses are based on a larger set of observed indicators than those included in the causal model; (2) the correlations on which the causal models are based were estimated for attenuation by controlling for measurement errors, and are typically larger than the observed correlations among the indicators included in the regressions; (3) the effects reported in Table 2 are in terms of explained variances (R^2 's), whereas those reported in Table 4 are standardized estimates of effects.
5. In a model in which peer alcohol use was allowed to load directly on adolescent marijuana use, the effect was found to be nonsignificant.

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