Chapter 10
Problem Behavior Theory and the Use of Marijuana

Richard Jessor and Shirley L. Jessor

In this chapter, we report some findings from a longitudinal study in which junior high school and college students were followed across four annual testings. Although the objectives of the study were broad and encompassed adolescent development in general, our concern here is focused primarily on the use of marijuana and on its personality, environmental, and behavioral antecedents, correlates, and consequences. Inasmuch as the strategy of longitudinal research is the unifying theme of this volume, a few comments about our own orientation to that theme may be helpful before turning to the study itself.

The uses of longitudinal or panel research are often too narrowly—and sometimes too optimistically—construed. Increasingly, one finds the same coda at the end of articles reporting on cross-sectional research findings: an exhortation that longitudinal study is needed to determine the causal structure of the obtained associations. The narrowness lies in the restriction of interest in longitudinal design to its relevance for causal inference only; the optimism lies in the rather naive notion that causal inference is easily attainable through mere temporal extension of observation. Neither perspective seems appropriate. In addition to their potential relevance to causal concerns, panel studies are uniquely important because of the *descriptive information* they can yield about process and change: descriptions of the course of human development, of the trajectories of psychosocial growth, or of the contour of

Reprinted with permission from:
Jessor, R., & Jessor, S. L. (1978). Theory testing in longitudinal research on marijuana use. In D. B. Kandel (Ed.), *Longitudinal research on drug use: Empirical findings and methodological issues* (pp. 41–71). Washington, DC: Hemisphere Publishing Corporation.

R. Jessor, Ph.D., Sc.D. (✉) • S.L. Jessor
Institute of Behavioral Science, University of Colorado Boulder, Boulder, CO 80309, USA
e-mail: jessor@Colorado.edu

R. Jessor, *Problem Behavior Theory and Adolescent Health*, Advancing Responsible Adolescent Development, DOI 10.1007/978-3-319-51349-2_10

behavioral trends. Descriptive data of this sort on youth are almost nonexistent at present, and their future accumulation depends entirely upon longitudinal study. It would indeed be unfortunate, as Wohlwill (1973) cautions, if we allowed traditional preoccupation with experimental paradigms to divert us from efforts to describe the natural course of individual change. Another unique use of longitudinal study is for assessing the adequacy of theories that contain propositions about development and change. Such dynamic formulations are obviously dependent upon time-extended research strategies.

The main contribution of panel design to causal inference itself would appear to derive from the temporal structure it imposes upon observation. Knowledge of temporal order and sequence does permit the rejection of certain alternative inferences. But causal inference depends ultimately on logic and theory rather than on an inevitable or automatic outcome of any research design. Causal inference is a presumption that, as Blalock (1964) points out, "can never be proved beyond all doubt no matter what the nature of one's empirical evidence" (p. 3). The problem remains the enduring, elusive, and general one of how to organize observations so they will have a coercive impact on inference, how to make a particular causal interpretation so compelling as to be almost inescapable. Generally, the compellingness of an inference increases as multiple lines of evidence converge upon it and as claims for alternative inferences can be empirically refuted or weakened. In an earlier work (Jessor, R., Graves, Hanson, & Jessor, S. L., 1968/1975, pp. 137–149), we discussed a variety of strategies in cross-sectional field research for *minimizing inferential ambiguity*. Longitudinal design is a particularly advantageous strategy toward that same end, but it would seem prudent to keep in mind that it is really only one more strategy in the armamentarium of inference.

In light of this perspective, our own longitudinal research was designed to make use of a variety of different strategies all of which, if convergent, might add an increment to the compellingness of interpretation: (1) the employment of a theoretical framework and of theory-derived measures; (2) a pervasive reliance on various kinds of replication—across time, across sex, across school levels, across cohorts within a school level, and across functionally related behaviors; (3) the demonstration of systematic cross-sectional relationships preliminary to examining time-extended ones; (4) the description of change over time in both "predictor" and "criterion" measures, with reliance on the logical implications of parallel change or concomitant variations; (5) the prediction, over time, of the onset of a new behavior, with reliance on the logical implications of successful forecasting of the initial occurrence of a behavioral event; and finally, (6) the demonstration of a systematic relation between time of onset of a behavior and variation in the course of psychosocial development, with reliance on the logical implications of such direct covariation. These various strategies provide the general structure for the chapter, and each is further elaborated to make its implications clearer; it should be noted, however, that only the last three depend uniquely upon the longitudinal design of the research.

A Social-Psychological Framework for the Study of Problem Behavior

The investigation of drug use in our research was part of a larger interest in exploring the utility of a social-psychological theory of problem behavior and development in youth. Formulated initially to guide a study of deviance in a triethnic community (Jessor, R., et al., 1968/1975), the framework has since been modified and extended to bear on problem behavior among youth in contemporary American society—drug use, drinking and problem drinking, sexual experience, activist protest, and general deviance including stealing, lying, and aggression (Jessor, R., 1976; Jessor, R., Collins, & Jessor, S. L., 1972; Jessor, R., & Jessor, S. L., 1973a, 1973b, 1975; Jessor, R., Jessor, S. L., & Finney, 1973; Jessor, S. L., & Jessor, R., 1974, 1975; Rohrbaugh & Jessor, R., 1975; Weigel & Jessor, R., 1973). In addition, the logical implications of the framework for adolescent development and change have also been elaborated. Because theory can increase the relevance of the observations achieved to the inferences sought, it has played a central role in our overall strategy. By enabling a behavior such as drug use to be embedded in a network of concepts, theory also makes it possible to see the logical relation to other behaviors and to variation in personality and environmental characteristics.

Because of limitations of space and because the entire social-psychological framework is extensively discussed in R. Jessor and S. L. Jessor (1977), our presentation here is fairly brief. The conceptual structure of Problem Behavior Theory is schematized in Fig. 10.1, and our discussion follows largely from it. In this chapter, we are concerned with the three boxes of variables labeled A, B, and C: the Personality System, the Perceived Environment System, and the Behavior System, respectively. The variables in all three of the systems lie at what is essentially a social-psychological level of analysis. The concepts that constitute personality, or the person system, (values, expectations, beliefs, attitudes, orientations toward self and others) are cognitive and reflect social meanings and social experience. The concepts that constitute the environment (supports, influence, controls, models, expectations of others) are those that are amenable to logical coordination with personality concepts and that represent environmental characteristics capable of being cognized or perceived; that is, they are socially organized dimensions of potential meaning for actors. Behavior, too, is treated from a social-psychological perspective, emphasizing its socially learned purposes, functions, or significance rather than its physical parameters. The occurrence of behavior is considered the logical outcome of the interaction of personality and environmental influence; in this respect, the formulation represents a social-psychological field theory, assigning causal priority neither to person nor to situation.

Each system is composed of structures of variables interrelated and organized so as to generate a resultant: a dynamic state designated "problem-behavior proneness" that has implications for a greater or lesser likelihood of occurrence of problem behavior. Instead of tracing the rationale for the selection of the particular variables and developing the reasoning that underlies their relation to problem behavior, it must suffice here just to list the characteristics of problem-behavior proneness in each system. In the Personality System, the main characteristics of proneness to problem behavior include lower value on academic achievement; higher value on independence; greater value on

independence relative to value on achievement; lower expectations for academic achievement; greater social criticism and alienation; low self-esteem and orientation to an external locus of control; greater attitudinal tolerance of deviance; lesser religiosity; and more importance attached to positive, relative to negative, functions of problem behavior. The more these personality characteristics obtain for a person at a given point in time—the more they constitute a coherent pattern, constellation, or syndrome—the more personality proneness to problem behavior they theoretically convey.

Our conceptual focus in the environment system has been on the environment as perceived, the environment of socially learned significance, the environment constituted out of "definitions of the situation" (Thomas, 1928). Logically, the perceived environment is the one that should have the most invariant relation to behavior, as we have argued elsewhere (Jessor, R., & Jessor, S. L., 1973b). (In that same paper, incidentally, we have shown that the environment represented by demographic characteristics is conceptually so remote from behavior that the correlations of such measures with marijuana use, at least in our samples, are close to zero.) Within the perceived environment, we draw an important distinction between "regions," or structures, in terms of their proximal, versus distal, relation to behavior. Proximal variables (for example, peer models for marijuana use) directly implicate a particular behavior, whereas distal variables (for example, the degree of normative consensus between parents and peers) are more remote in the causal chain and therefore require theoretical linkage to behavior. Problem-behavior proneness in the Perceived Environment System consists of low parental support and controls; low peer controls; low compatibility between parent and peer expectations; and low parent, relative to peer, influence within the distal structure. In the proximal structure, problem-behavior proneness includes low parental disapproval of problem behavior and both high friends models for and high friends approval of engaging in problem behavior.

The Behavior System is differentiated into a problem-behavior structure and a conventional-behavior structure. *Problem behavior* refers to behavior socially defined either as a problem, as a source of concern, or as undesirable by the norms of conventional society or the institutions of adult authority; it is behavior that usually elicits some kind of social-control response. The latter, of course, may be as minimal as an expression of disapproval or as extreme as incarceration. The possibility that phenotypically very different behaviors (for example, smoking marijuana, engaging in sexual intercourse, or taking part in a peaceful demonstration) may all serve the same social-psychological function (for example, overt repudiation of conventional norms or expressing independence from parental control) is what underlies the notion of a structure of problem behavior. Research that is behavior specific, perhaps focusing on drug use alone, risks being theoretically parochial and ignores the important significance of the concept of problem behavior as one that may subtend functionally similar, mutually substitutable, even simultaneously learned, alternative social behaviors. The array of behaviors in the problem-behavior structure makes possible, not only an examination of their interrelations, but also—in providing multiple criterion variables—a more exhaustive appraisal of the explanatory capability of Problem Behavior Theory. Related to the making of such an appraisal is the conventional-behavior structure, which includes behaviors that should enable a demonstration of discriminant validity in the application of Problem Behavior Theory.

Thus far, our interest in Fig. 10.1 has been cross-sectional. We have been concerned with describing problem-behavior proneness separately within the Personality and Perceived Environment Systems and, thereby, with separate linkages to the Behavior System, but as the heavy arrow connecting boxes A and B with C suggests, a further cross-sectional aim is to examine the *joint* relation between those two systems and behavior, that is, to take what we have termed the *field theoretical approach* to explanation.

Not dealt with as yet are the logical implications in Problem Behavior Theory for development and change, some comment on which is necessary. Although no time dimension is represented in Fig. 10.1, implications for change over time can be drawn from the theory by the elaboration of the notions of age grading, age norms, and age expectations in relation to problem behavior (for a recent review of some of these considerations of age stratification and differentiation, see Elder, 1975; see also Riley, Johnson, & Foner, 1972). Neugarten and Datan (1973), in a very provocative essay, have pointed to the fact that "every society has a system of social expectations regarding age-appropriate behavior … [and] … individuals themselves are aware of age norms and age expectations in relation to their own patterns of timing" (pp. 59, 61). Much of what we have discussed as problem behavior is, of course, relative to age-graded norms; that is, the behavior may be permitted or even prescribed for those who are older, while being proscribed for those who are younger. Drinking, as one example, is proscribed for those under legal age but is permitted and even institutionally encouraged for those who are beyond that age; sexual intercourse, normatively acceptable for adults, is a normative departure for a young adolescent, and one that is likely to elicit social controls. Consensual awareness among youth of the age-graded norms for such behaviors carries with it, at the same time, the shared knowledge that occupancy of a more mature status is actually characterized by engaging in such behavior. Thus, engaging in certain behaviors for the *first* time can mark a transition in status from "less mature" to "more mature," from "younger" to "older," or from "adolescent" to "youth" or "adult."

Many of the important transitions that mark the course of adolescent development involve behaviors that depart from the regulatory age norms defining appropriate or expected behavior for that age or stage in life. It is important to emphasize that *behavior that departs from regulatory norms is precisely what Problem Behavior Theory is meant to account for,* and this becomes the basis for the systematic application of Problem Behavior Theory to developmental change in adolescence. By mapping the developmental concept of *transition proneness* onto the theoretical concept of *problem-behavior proneness,* it becomes possible to use Problem Behavior Theory to specify the likelihood of occurrence of developmental change through display of age-graded, norm-departing, transition-marking behaviors.

In summary, we have sketched out the structure and content of Problem Behavior Theory and its logical implications for both cross-sectional and longitudinal variation in problem behavior including the use of marijuana. Testing those implications leads us to examine both cross-sectional and panel data in accordance with the various strategies noted at the outset of the chapter. Before doing that, however, the general methodology of the research and the research design itself need to be described.

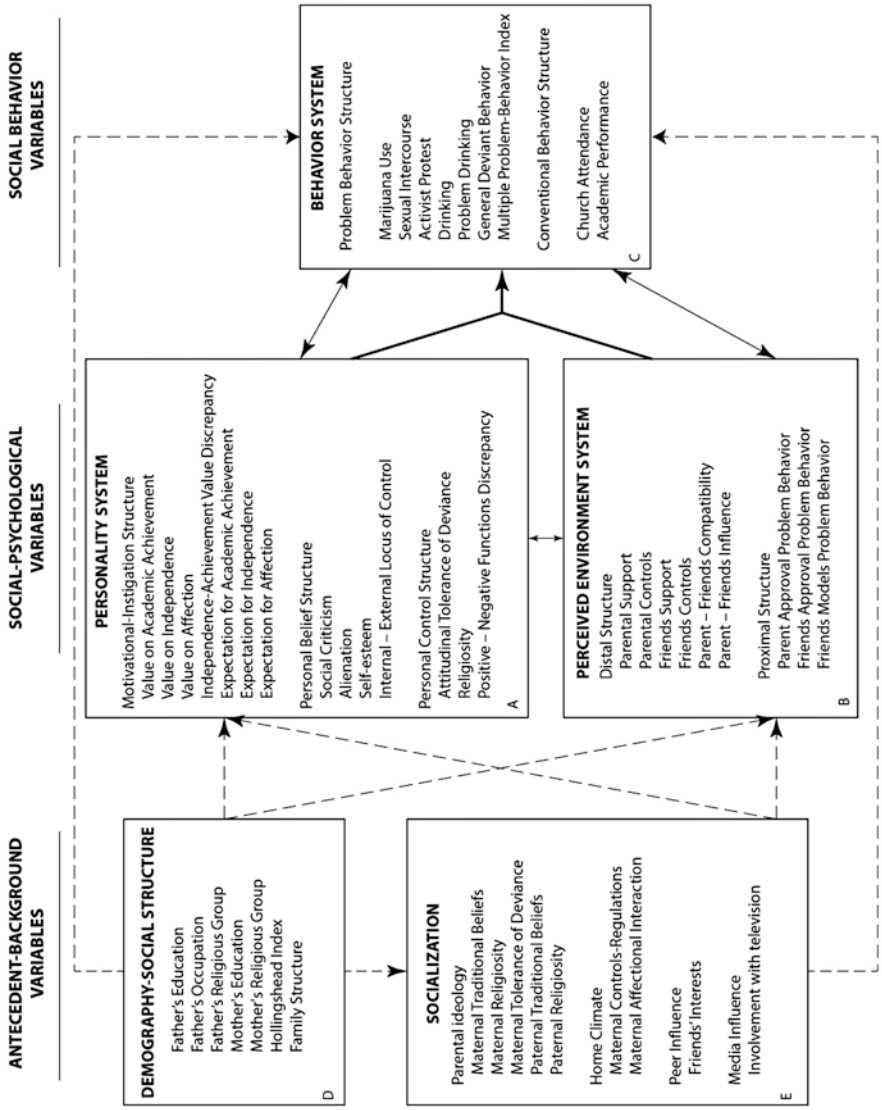

Fig. 10.1 The conceptual structure of Problem Behavior Theory (Jessor & Jessor, 1977)

Design of the Research

The larger research project included two parallel, but separate, short-term, longitudinal studies, one of high school youth and one of college youth. In each study, each participant was tested on four successive annual occasions so that there were four temporally ordered data points over an actual time span of 3 years. The initial data in the high school study were collected in April–May of 1969, and the final data were collected at the same point in the spring of 1972. The initial data in the college study were collected in April–May of 1970; final data, in the spring of 1973.

As part of a larger sampling design for the high school study, a random sample of 1,126 students, stratified by sex and grade level, was designated in grades 7, 8, and 9 of three junior high schools in a small city in the Rocky Mountain region. Students were contacted by letter and asked to participate in a 4-year study of personality, social, and behavioral development. Parents were also contacted by letter and asked for signed permission for their child's participation. Permission was received for 668 students and, of these, 589 (52% of the random sample) took part in the Year I testing in the spring of 1969. By the end of the Year IV testing in 1972, 483 students were still in the study, representing 82% retention of the Year I participants. Of these, there were 432 students (188 boys and 244 girls) for whom there was no missing year of data. It is this latter group that constitutes our high school core sample for longitudinal or developmental analyses, and it is this sample on which the high school data presented in this chapter are based. The sample is actually composed of six separate, sex-by-grade cohorts as of 1969: seventh-grade males (N = 75), seventh-grade females (N = 96), eighth-grade males (N = 60), eighth-grade females (N = 82), ninth-grade males (N = 53), and ninth-grade females (N = 66). By the final year in 1972, these students—initially all in junior high school—had reached senior high school and were in grades 10, 11, and 12.

The core sample, then, represents good retention (73%) of the initial-year participants over four annual testings; it provides a wide range of variation on all measures; and it is large enough to permit the kinds of breakdowns needed for the analyses reported later on in the chapter. Although generalization to the parent population is precluded by the fact that the core sample constitutes only 38% of the original random sample, the core sample is, nonetheless, satisfactory for the testing of hypotheses about variation in behavior and development. Demographically, the core sample is relatively homogeneous: almost entirely Anglo-American in ethnic background and middle class in socioeconomic status.

Data were collected in April–May of each year by an elaborate questionnaire, approximately 50 pages in length, requiring about an hour and a half to complete. The questionnaire consisted largely of psychometrically developed scales or indexes assessing the variety of personality, social, behavioral, and demographic variables shown in the conceptual framework in Fig. 10.1. Although many of the measures derive from and were validated in previous work (for example, Jessor, R., et al., 1968/1975), prior to its present use, the entire questionnaire was pretested and scales were revised to increase their appropriateness for the student samples. The

majority of scales were kept constant over the testing years, but modifications were made in some, and new ones were added at various times. Administration of the questionnaires took place in small group sessions outside of class, and strict confidentiality was guaranteed because questionnaires had to be signed to permit follow-up.

For the college study, a random sample of 497 freshman students was designated in the College of Arts and Sciences of a university in the same Rocky Mountain city. When contacted by letter in the spring of 1970 and asked to participate in the research over the next four years, 462 students were still in school. Of those contacted, 276 (60%) participated in the spring 1970 initial testing. By the end of the Year IV testing in 1973, 226 students were still in the study, and 205 of these had no missing year of data. The latter group (92 men and 113 women) constitutes the core developmental sample in the college study; the members represent 41% of the original random sample and 74% of the participants who had been tested in the freshman year.

Dropping out of school or moving away from the community were negligible in the high school study. In the college core sample, by 1973, 64% were still at the same university, 20% were at another university, and 16% had dropped out of school at some point and not returned, even though remaining in the study.

In the college study, data were also collected by questionnaires, administered in small group sessions, with confidentiality guaranteed. The questionnaire was very similar to that used in the high school, and many of the scales were, in fact, identical. Table 10.1 lists most of the major scales reported on in this chapter; it shows the number of items in each scale, the possible score range, Scott's homogeneity ratio (about .33 is considered optimal), and Cronbach's alpha reliability for both the high school and the college studies. For the most part, especially where scales have more than a few items, measurement properties are quite satisfactory.

Interest in the study was high among both the high school and the college students, and the quality of the questionnaire data is generally excellent. Participants seemed especially to appreciate the comprehensiveness of the questionnaire and its coverage of a wide range of content. Analyses of the attrition subsequent to the initial year of testing indicate that those who left the study were very similar on their initial-year data in both studies to those who stayed. Thus, selective dropout from the studies does not seem to be a source of additional bias beyond the original erosion from the designated random samples.

Several features of the research design are worth emphasizing in relation to the methodological orientation of the study as a whole. The first and most apparent one is the provision made for pervasive replication of observations and findings. For example, in both the high school study and the college study, there is opportunity to carry out four, separate, annual cross-sectional tests of the explanatory usefulness of the social-psychological framework. In addition, within any year, findings can be replicated across sexes, across age or grade groups, and across the two different school contexts. Considering the six sex-by-grade cohorts in the high school study and the two sex cohorts in the college study, there are actually eight independent subsamples in which any theoretical relationship may be separately examined. The possibility for such replication over time and across samples lessens the likelihood

Table 10.1 Scale Properties of the Year IV Measures in the High School Study (1972) and College Study (1973) Questionnaires

	High School Study				College Study			
Measure	Number of items	Score range	Scott's H.R.	Cronbach's alpha	Number of items	Score range	Scott's H.R.	Cronbach's alpha
Personality System								
Motivational-instigation structure								
Value on academic achievement	10	0–90	.53	.91	10	0–90	.48	.90
Value on independence	10	0–90	.35	.84	10	0–90	.28	.78
Value on affection	10	0–90	.41	.87	10	0–90	.45	.89
Expectation for academic achievement	10	0–90	.57	.92	10	0–90	.49	.90
Expectation for independence	10	0–90	.36	.85	10	0–90	.21	.71
Expectation for affection	10	0–90	.42	.88	10	0–90	.48	.90
Personal belief structure								
Social criticism	9	9–45	.20	.69	13	13–52	.30	.85
Alienation	15	15–60	.23	.81	15	15–60	.23	.81
Self-esteem	10	10–40	.29	.80	10	10–40	.33	.83
Internal-external control	22	22–110	.13	.77	18	18–90	.15	.76
Personal control structure								
Tolerance of deviance	26	0–234	.36	.93	20	0–180	.36	.92
Religiosity	7	0–28	.55	.89	5	4–20	.49	.82
Perceived Environment System								
Distal structure								
Parental support	2	2–10	.56	.71	2	2–10	.59	.74
Parental controls	2	2–10	.46	.62	2	2–10	.41	.58
Friends support	2	2–10	.52	.68	2	2–10	.59	.73
Friends control	2	2–10	.16	.28	2	2–10	.34	.51
Parent-friends compatibility	3	3–15	.56	.79	3	3–15	.56	.79
Parent-friends influence	2	2–6	.47	.64	2	2–6	.44	.61
Proximal structure								
Parent approval problem behavior	4	α	.33	.66	4	α	.22	.53
Friends approval problem behavior	4	α	.28	.61	4	α	.26	.58
Friends model problem behavior	3	α	.45	.71	4	α	.27	.59

(continued)

Table 10.1 (continued)

Measure	High School Study				College Study			
	Number of items	Score range	Scott's H.R.	Cronbach's alpha	Number of items	Score range	Scott's H.R.	Cronbach's alpha
					Behavior System			
					Problem-behavior structure			
Marijuana behavior involvement	4	0–8	.65	.88	4	0–8	.52	.81
General deviant behavior	26	26–104	.21	.85	20	20–80	.16	.74
Multiple problem-behavior index	5	0–5	.28	.66	5	0–5	.13	.43

[α]These scale scores are the sum of *z* scores from separate subscales. In the High School Study, a constant of 11.0 was added to the *z*-score sums.

that findings would reflect the vicissitudes of a particular testing year or that the idiosyncrasies of a particular sample would be given more credence than deserved. Second, the previously noted descriptive interest in psychosocial development can obviously be pursued by following the cohorts through time with repeated measures. Third, the design makes possible the testing of the predictive implications of the theory by permitting the accumulation of data temporally antecedent to the event being predicted, for example, the initial use of marijuana among those who had not begun using it until after the Year I testing. The fourth and final feature worth mentioning, as it is not obvious in the structure of the design, is the role played by the theory in the content of the measures employed. Most of the major measures were theoretically derived to capture the logical properties of the concepts in the framework; as such, they make the data they yield germane to the testing of the theory in a way that ad hoc measures usually do not.

With this discussion in mind, we can turn to the presentation of specifically selected data from the overall longitudinal project. The presentation of data is organized around the several inferential strategies already listed. The strategy of reliance upon theory serves throughout as the background against which the data constitute the figure. The strategy of replication is illustrated in the context of the other strategies. Thus, we can begin with the first strategy that refers to a particular analytic mode: the analysis of cross-sectional relationships.

Cross-Sectional Analysis as Part of a Longitudinal Strategy

Because the appraisal of theoretical expectations on the basis of cross-sectional data is the conventional practice in most studies, a word should be said about our inclusion of this kind of analysis as part of a set of strategies in longitudinal research. If the research enterprise itself can be looked at as a developmental process through

time, it might be argued that the establishment of cross-sectional relationships should be an ontogenetically prior stage to the investigation of time-extended relationships. The latter, precisely because of the time dimension involved, is likely to be a much more refractory and uncertain endeavor than the former. The prior demonstration that the relationships sought do indeed obtain at a cross section in time constitutes the kind of preliminary step to longitudinal inquiry that can provide the latter with both rationale and focus. Support for the cross-sectional utility of the theory serves, in short, to make its longitudinal appraisal a logical next step (and in any case, cross-sectional analyses offer the fringe benefit of giving the longitudinal researcher something to do while waiting for time to pass).

Our focus in this section is on a measure of increasing involvement with marijuana—the marijuana behavior involvement scale—and on marijuana user versus non user status. The marijuana behavior involvement scale includes four items:

1. Have you ever tried marijuana?
   Never ____ Once____ More than Once____
2. Have you ever been very high or stoned on marijuana to the point where you were pretty sure you had experienced the drug's effects?
   Never ____ Once____ More than Once____
3. Do you or someone very close to you usually keep a supply of marijuana so that it's available when you want to use it?
   No____ Yes____
4. Do you use marijuana a couple of times a week or more when it's available?
No____ Yes____

Data on this measure from the 1970 testing in both the high school and college were reported in R. Jessor, S. L. Jessor, and Finney (1973); the data considered here are from the Year IV (1972) testing in the high school study, and they are presented in Tables 10.2 and 10.3.

The data in the first column of Table 10.2 are correlations of the measures in the three structures of the Personality System with the measure of marijuana behavior involvement, for males and females separately. Support for the hypothesized personality-behavior linkage (the arrow, in Fig. 10.1, between box A and box C) is clear and quite pervasive. The strongest and most consistent relations between personality and marijuana involvement are those of the measures of the personal control structure, every one of which is significantly associated, and some of which are substantial in magnitude. Adolescents who are more intolerant of deviance and more religious have lesser involvement with marijuana. In the three areas of drinking, drug use, and sex, the more that importance is attached to positive, relative to negative, functions of these behaviors, the lower the control these functions exert and the greater the involvement with marijuana. Drug disjunctions, the most proximal of the three functions-disjunction measures, has, as expected, the strongest relation to marijuana use. Of importance to note is the comparability of these personal-control findings for males and females.

Next in importance in accounting for involvement with marijuana are the motivational-instigation measures. The strongest correlation for both sexes is the

Table 10.2 Pearson Correlations between Personality System Measures and Selected Behavior System Measures in the High School Study, Year IV (1972)

Personality System measures	Behavior System measures					
	Marijuana behavior involvement		Deviant behavior in past year		Church attendance in past year	
	Male[a]	Female[b]	Male[a]	Female[b]	Male[a]	Female[b]
Motivational-instigation structure						
Value on academic achievement	−.27***	−.31***	−.21**	−.39***	.10	.24***
Value on independence	.09	.19**	.09	.13	−.21**	−.08
Value on affection	−.22**	−.19**	−.02	−.13	−.01	.17*
Independence-achievement value discrepancy	.31***	.39***	.24**	.44***	−.23**	−.27***
Expectation for academic achievement	−.16*	−.14*	−.28***	−.29***	−.04	.09
Expectation for independence	.06	.23***	.08	.11	−.21**	−.24***
Expectation for affection	−.12	.01	.02	−.05	−.12	.02
Personal belief structure						
Social criticism	.33***	.35***	.19*	.18**	−.11	−.21**
Alienation	.08	.08	.09	.14*	−.08	−.05
Self-esteem	.10	.08	.10	−.05	−.19*	−.04
Internal-external control	−.17*	−.06	−.27***	−.12	.03	.10
Personal control structure						
Tolerance of deviance	−.41***	−.40***	−.61***	−.57***	.18*	.22**
Religiosity	−.27***	−.31***	−.17*	−.27***	.58***	.48***
Drinking disjunctions	.16*	.18**	.22**	.31***	.02	−.10
Drug disjunctions	.58***	.64***	.27***	.44***	−.10	−.36***
Sex disjunctions	.28***	.38***	.35***	.37***	−.22**	−.32***

[a]$N = 188$
[b]$N = 244$
*$p < .05$
**$p < .01$
***$p < .001$

Table 10.3 Correlations between Measures of the Perceived Environment System and Selected Behavior System Measures in the High School Study, Year IV (1972)

Perceived Environment System measures	Behavior-system measures					
	Marijuana behavior involvement		Deviant behavior in past year		Church attendance in past year	
	Male[a]	Female[b]	Male[a]	Female[b]	Male[a]	Female[b]
Distal structure						
Parental support	−.31***	−.21**	−.28***	−.13	−.04	.11
Parental controls	−.15*	−.07	−.04	−.01	.18*	.09
Friends support	.00	.13	−.11	.14*	−.01	−.02
Friends controls	−.43***	−.35***	−.24**	−.22**	.19*	.20**
Parent-friends compatibility	−.31***	−.33***	−.25***	−.25***	.08	.17*
Parent-friends influence	.29***	.18**	.16*	.25***	−.02	−.19**
Proximal structure						
Parent approval problem behavior	.34***	.28***	.19*	.04	−.28***	−.29***
Friends approval problem behavior	.55***	.60***	.36***	.49***	−.32***	−.32***
Friends model problem behavior	.60***	.61***	.44***	.52***	−.22**	−.26***

[a] $N = 188$
[b] $N = 244$
* $p < .05$
** $p < .01$
*** $p < .001$

independence-achievement value discrepancy; as expected, the more independence is valued relative to the value on academic achievement, the greater the involvement with marijuana. This finding is supported by the negative correlations with the measures of value on achievement and expectation for achievement, and also by the positive correlations (females only) with value on independence and expectation for independence. Finally, among the measures of personal beliefs, social criticism is positively associated with marijuana use, and consistently so for both sexes, but neither alienation nor self-esteem demonstrates any relationship at all.

Overall, as far as the link between personality and marijuana involvement is concerned, there is evidence for the conclusions that personality characteristics play a modest but significant role, and that the pattern of relations is similar for both males and females. Before turning to the perceived environment, it is of interest to examine the remaining data in Table 10.2. Another problem-behavior measure has

been presented to illustrate the generality of the linkage between personality and problem behavior, and a measure of conventional behavior has been presented for discriminant validity. The measure of deviant behavior in the past year focuses on what might be called "conventional deviance," that is, lying, stealing, and aggression. None of the items has any reference at all to drug use, alcohol, sex, or protest. The pattern of findings is similar to that for the marijuana measure: The strongest relations are with the personal control measures (tolerance of deviance, now the most proximal to this criterion, has the largest correlation); the motivational-instigation measures, especially independence-achievement value discrepancy, are the next strongest; the personal belief measures are least related (interestingly, social criticism is substantially less associated with this criterion measure than it was with marijuana use). The pattern of relations is, once again, generally similar for both sexes. This introduction of another problem-behavior criterion measure makes it clear that the linkage between personality and marijuana use is not behavior specific, and this is a very important contribution to the explanatory effort.

The correlations in Table 10.2 with the frequency of church attendance in the past year add to our conviction about the adequacy of the measures and the theoretical formulation. The key personality measures relate to this measure of conventional behavior in a direction opposite to their relation to the two problem-behavior measures, as would be expected theoretically.

In Table 10.3, the high school data are presented for the measures of the Perceived Environment System in relation to the same three behavioral criteria. There is consistent and even substantial support for the hypothesized environment-behavior linkage (represented by the arrow, in Fig. 10.1, between box B and box C). With respect to the marijuana involvement criterion, the expected prepotency of the proximal environment is apparent, with the two measures that refer to the peer reference group—friends approval for and friends models of problem behavior—having correlations of considerable magnitude for both sexes. The measures in the distal structure are also of interest; the more a supportive relation with parents is perceived, the less the involvement with marijuana. The measures of perceived compatibility or agreement between parents and friends and of the relative influence of these two different reference groups are particularly revealing: the less the compatibility and the greater the relative influence of friends, the greater the involvement with marijuana. Both of these measures suggest, other things being equal, that the developmental move out of the family context and into the peer context, either into incompatible peer expectations or into greater peer influence, is associated with an increase in behavior that departs from the norms of adult society, in this case, marijuana use.

The data for the deviant behavior and the church attendance measures play the same role they did in the preceding table. Relationships of the perceived environment measures to deviant behavior are comparable to their relationships with marijuana use, although not as strong, and are again similar for both sexes. With regard to church attendance, the expected opposite relations are apparent, especially in the proximal structure.

Table 10.4 Mean Scores of Nonusers and Users of Marijuana on Personality System Measures in the High School Study, Year IV (1972)

	Males		Females	
Personality System Measures	Nonusers ($N = 117$)	Users[a] ($N = 68$)	Nonusers ($N = 148$)	Users[a] ($N = 95$)
Motivational-instigation structure				
Value on academic achievement	68.2	58.4***	67.6	53.7***
Value on independence	72.7	74.1	76.0	78.8*
Value on affection	66.4	59.0**	71.2	65.4**
Independence-achievement value discrepancy	94.5	105.6***	98.4	115.1***
Expectation for academic achievement	60.5	54.2*	59.2	51.0**
Expectation for independence	70.3	70.7	73.1	77.4**
Expectation for affection	58.3	54.3	60.5	59.9
Personal belief structure				
Social criticism	27.8	31.8***	29.7	32.7***
Alienation	34.6	36.1	35.3	36.6
Self-esteem	29.7	30.1	30.0	30.3
Internal-external control	61.7	58.4**	62.3	61.6
Personal control structure				
Tolerance of deviance	162.7	133.7***	176.9	151.8***
Religiosity	15.1	11.0***	17.4	12.5***
Drinking disjunctions	31.6	34.0	27.8	31.6*
Drug disjunctions	17.7	27.0***	15.5	28.4***
Sex disjunctions	18.9	21.1*	13.2	18.3***

[a]Asterisks refer to the level of significance of the difference between the nonuser and the user mean scores by one-way analysis of variance, two-tail test

*$p < .05$

**$p < .01$

***$p < .001$

The cross-sectional data thus far presented have been correlational and focused on a particular measure of marijuana involvement. That measure, marijuana behavior involvement, has been used throughout our research and in a national-sample survey of high school youth as well. As noted earlier, the measure includes items referring to getting high or stoned and to safeguarding a supply, as well as to frequency of use; in these respects, therefore, it differs from the use, versus nonuse, measure employed in most other research. The measure of marijuana behavior involvement has shown excellent Guttman-scale properties in both the present study and the national-sample study. Nevertheless, to make clear that the findings are stable and are not dependent on the particularities of a measure or statistic, another kind of analysis is presented in Tables 10.4 and 10.5. Here the participants in the high school study are divided by use status, *users* being those reporting at least more than once use of marijuana.

Table 10.5 Mean Scores of Nonusers and Users of Marijuana on Measures of Perceived Environment System: in the High School Study, Year IV (1972)

Perceived Environment System measures	Males		Females	
	Nonusers ($N = 117$)	Users[a] ($N = 68$)	Nonusers ($N = 148$)	Users[a] ($N = 95$)
Distal structure				
Parental support	7.7	6.5***	7.8	7.1**
Parental controls	6.4	5.6**	6.0	5.5
Friends support	6.7	6.6	7.6	8.0
Friends controls	6.4	5.3**	6.7	5.7***
Parent-friends compatibility	8.5	7.3**	9.0	7.2***
Parent-friends influence	3.2	3.7**	3.4	3.9*
Proximal structure				
Parent approval problem behavior	10.4	12.4***	10.3	11.8***
Friends approval problem behavior	10.0	12.6***	9.8	13.1***
Friends model problem behavior	9.6	12.4***	10.0	13.2***

[a]Asterisks refer to the level of significance of the difference between the nonuser and the user mean scores by one-way analysis of variance, two-tail test

*$p < .05$

**$p < .01$

***$p < .001$

Mean differences between nonusers and users on the various theoretical measures are evaluated by analysis of variance. An examination of the personality data in Table 10.4 and of the perceived environment data in Table 10.5 makes clear both their consistency with the correlational data on the somewhat different marijuana involvement measure presented earlier and their similarity for both sexes.

The final concern of the cross-sectional strategy is one that follows from the fact that the theoretical framework illustrated in Fig. 10.1 is based upon a multivariate logic. The logic of each of the systems rests upon the joint operation of its component structures and variables, and the logic of the framework as a whole rests upon the joint contribution of the separate systems. To pursue these implications, we have relied upon multiple regression analyses carried out in what we have termed a *uniform multivariate analysis procedure*. This procedure involves a standard set of 14 multiple regressions run against each criterion measure for each sample in each study, both for a key data year and for a replication year. The 14 regressions are organized in sequential, cumulative sets to make possible an examination of the multivariate account achieved by each set of variables independently and prior to its inclusion with other sets of variables. In addition, not all the variables in the framework are used in the various sets and, as sets are cumulated, only certain variables of key theoretical interest are carried along, while others are dropped. Thus, the aims of the uniform multivariate analysis procedure are (1) to maintain the focus on the theoretical concerns by restricting the number of variables used and by examin-

Table 10.6 Multiple Correlations of Theoretical Structures and Systems with Marijuana Behavior Involvement in the High School Study, Year IV (1972), and College Study, Year IV (1973)

	High school study		College study	
Multivariate run	Male (N = 188)	Female (N = 244)	Male (N = 92)	Female (N = 113)
1. Motivational-instigation	.31	.39	[g]	.25[h]
2. Personal belief	.35	.36	.40	.42
3. Personal control	.45	.44	.41	.36
4. Personality System[a]	.52 (.49)[f]	.54 (.45)	.40 (.48)	.43 (.51)
5. Distal structure	.42	.37	.22	.35
6. Proximal structure	.66	.66	.56	.64
7. Perceived Environment System[b]	.65 (.59)	.64 (.61)	.54 (.44)	.60 (.70)
8. Field pattern[c]	.65 (.60)	.68 (.59)	.57 (.55)	.61 (.70)
9. Aggregate set[d]	.70	.70	.69	.69
10. Functions discrepancy	.59	.64	.45	.56
11. Behavior	.60	.61	.49	.43
12. Functions-behavior	.72	.71	.56	.59
13. Socioeconomic background	[g]	.16	[g]	[g]
14. Overall set[e]	.76 (.71)	.77 (.70)	.67 (.70)	.68 (.77)

Note: All runs are stepwise regressions with an F-to-enter of 2.0 and an F-to-delete of 1.0. The names for the runs refer to the theoretical structures and systems shown in Fig. 10.1

[a]Run 4, Personality System, is a selection of the five theoretically most important variables from the nine variables in Runs 1, 2, and 3

[b]Run 7, Perceived Environment System, is a selection of the four theoretically most important variables from Runs 5 and 6

[c]Run 8, Field pattern, is a selection of six variables from those in Runs 4 and 7

[d]Run 9, Aggregate set, includes all 16 of the variables used in Runs 1, 2, 3, 5, and 6, and thus it serves to maximize the R^2 as against the theoretically focused R^2 yielded by Run 8

[e]Run 14, Overall set, adds selected behavior and functions and demographic measures to the variables included in Run 8 and reflects the contribution of more of the domains in the larger conceptual framework shown in Fig. 10.1

[f]Rs in parentheses are the comparable multiple correlations from the replication analyses of the Year III data in the high school and Year II data in the college

[g]None of the variables in the set entered significantly

[h]This multiple correlation does not reach an F value that is significant at the .05 level or better; all correlations without this symbol are significant at the .05 level or better

ing the theoretical structures separately and (2) to appraise the magnitude of the variance in the criterion measures that can be accounted for by the joint influence of the components in the framework. Greater detail about the procedure and the specific variables used appears in R. Jessor and S. L. Jessor (1977, pp. 127–142). For present purposes, we rely on the information provided in Table 10.6.

The data in Table 10.6 are multiple correlations for the 14 separate runs against the marijuana behavior involvement scale. The table shows the replications of the multiple regressions across the two sexes and in both the high school study and the

college study for their Year IV data. In parentheses are the comparable multiple correlations from the replications on the Year III data. From this array of replications, it is possible to get a sense of the stability and generality of the findings as well as some conviction about the general amount of variance for which the different sets of variables and the overall framework can account.

There is a great deal of information in Table 10.6, only a portion of which can be addressed in this context. Consider the males in the high school study for example. The Personality System run, which includes five variables, achieves an $R = .52$. This is an increase over the highest bivariate correlation of its best component, namely, the .41 correlation of tolerance of deviance with marijuana involvement. The run for the Perceived Environment System for the males yields an $R = .65$, which is higher than the .60 bivariate correlation of its strongest component, friends models for problem behavior. The field pattern, combining personality and environment, does not, in this case, yield a larger R than the environment alone. The overall set, a combination of 14 selected personality, perceived environment, behavioral, and socioeconomic-background variables (out of the 24 that are used in the procedure), yields a multiple R of .76, indicating that a substantial amount of variance in the marijuana involvement criterion—over 50%—is accounted for by the problem behavior framework.

The consistency of the major multiple *Rs* is noteworthy across sexes, across data years, and even across the two studies. For example, the eight separate multiple *Rs* for the overall set are all fairly close together. They all generate R^2 s that account for about 50% of the criterion variance. Cross-sectional support for the utility of the framework, in relation to marijuana involvement, appears strong; but further strengthening comes from two additional considerations. First, when the uniform multivariate analysis procedure is applied, within the high school study, to the six sex-by-grade cohorts (rather than to the combined males and the combined females as in Table 10.6), the *R*s for the overall set against the marijuana criterion are .81, .79, and .81 for 10th-, 11th-, and 12th-grade males, respectively, and .79, .85, and .74 for the 10th-, 11th-, and 12th-grade females, respectively. Thus, the utility of the theory is apparent also at the specific cohort level. Second, when a different marijuana criterion is considered—a direct measure of frequency of use of marijuana in the past 6 months—the multiple *Rs* for the overall set are .63, .52, .63, and .48 for high school males, high school females, college males, and college females, respectively. Although considerably lower, these *Rs* are still significant and substantial, and they reflect a degree of robustness of the framework over alternative criterion measures in the drug use domain. It is of further interest in this regard to report the multivariate data from a recent national-sample survey of junior-senior high school youth that included many of our predictor measures. For a sample of over 6,000 males and over 6,000 females, the multivariate run equivalent to our overall set yielded multiple correlations against marijuana behavior involvement of .74 and .75, respectively (see Chase & Jessor, R., 1977).

The data in this section make a strong case for the cross-sectional utility of Problem Behavior Theory in relation to involvement with marijuana use. With these considerations serving as groundwork, it is now possible to turn to the first of three specifically longitudinal strategies for inference.

Description of Change as Part of a Longitudinal Strategy

The paucity of descriptive knowledge about the social-psychological growth of adolescents seriously limits efforts at understanding the nature of problem behavior. In our own work, considerable attention has been given to establishing how the variables in the theory change over time, to describing their trajectories, and to plotting "growth curves" of personality, environmental, and behavioral attributes during this developmental period. Establishing the fact that change takes place and the shape of its course, while important in its own right, has the additional advantage of providing a strategy, albeit an indirect one, for testing the developmental adequacy of Problem Behavior Theory. That strategy rests upon the theoretical expectation that there should be a *consonance* between the developmental changes occurring in the personality and the perceived environment measures—the "predictors"—on the one hand, and the behavior measures—the "criteria"—on the other. Such a developmental consonance, the congruence of theoretically parallel change, would constitute initial support for the relevance of the explanatory variables to behavioral development.

The implementation of this strategy can be accomplished by presenting, in graphic form, the changes on the measures of a few selected variables over the time span of the research. In Fig. 10.2, the scores on the measure of value on academic achievement over the four annual testings are presented for the six sex-by-grade cohorts in the high school study. The most striking aspect of the six trajectories is their decline over the years; all the declines are statistically significant as indicated both by one-way analyses of variance across time and by matched-sample *t* tests of the difference, for each cohort, between its Year I and its Year IV mean score (the only exception is the ninth-grade female cohort, which declines significantly to 1971 but then increases). The consistency of these curves suggests a developmental lessening of the importance attached to academic achievement during the adolescent years. Given our theoretical interpretation of value on academic achievement as conventionally oriented motivation, this developmental trend is in a direction away from conventionality; it implies, instead, a higher problem-behavior proneness with development during adolescence.

The same data can be plotted against age to yield an age-related picture of the developmental changes in value on academic achievement in the various cohorts, over the age span of 13 to 18 in the high school study. This has been done in Fig. 10.3, and the college study data have also been added to include the entire age range covered by our research. Looked at with a smoothing eye, there is a best-fitting line that suggests a clear developmental decline in value on academic achievement through the adolescent period from 13 to 18, with a possible leveling out near the end. Although the college sample is not really comparable to the high school samples, it is of interest to see that the college males and females start out not very different from where the high school cohorts finish, and they continue the leveling out suggested by the latter.

Plotting the data for value on independence would show a significant increase for the cohorts over time. Because higher value on independence is, theoretically, a

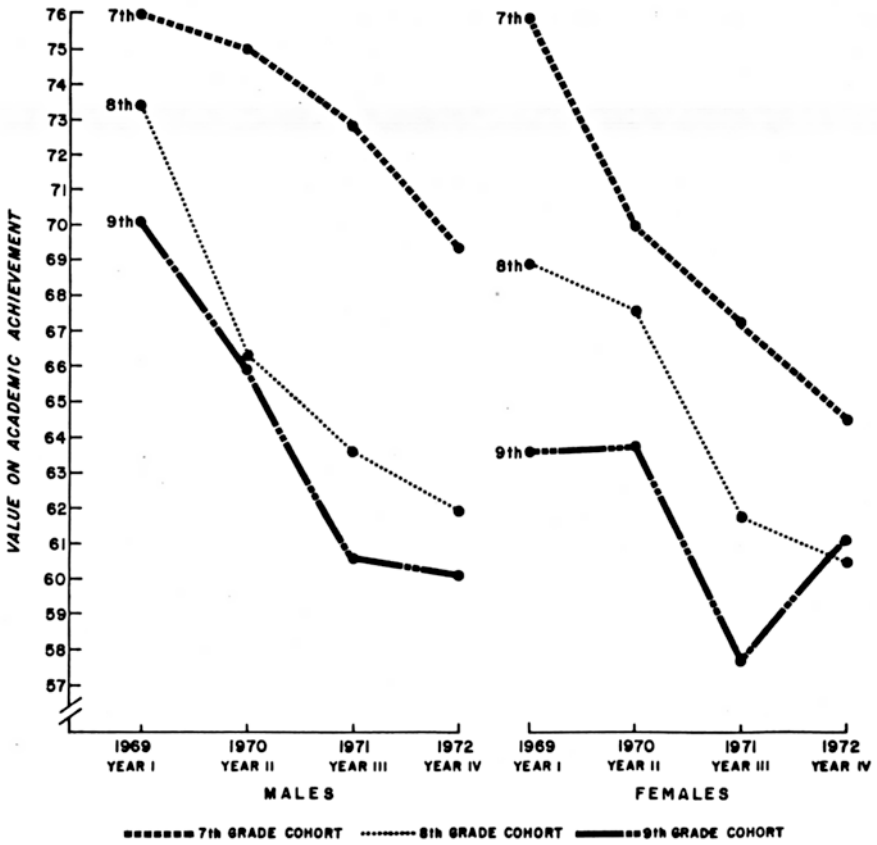

Fig. 10.2 Personality development during adolescence in the High School Study

problem-prone motivational orientation, these changes are also in the direction of an increased likelihood of problem behavior with adolescent development. Thus, the decline in value on academic achievement and the increase in value on independence are consonant in their implications for problem behavior. The developmental changes in altitudinal tolerance of deviance (a variable in the personal control structure) show a consistent decline in intolerance for both sexes. This increased acceptance of transgression is also theoretically consonant with the directions of the two previously discussed personality attributes.

Turning to the perceived environment, we have argued elsewhere (Jessor, R., & Jessor, S. L., 1973b) that it makes sense to conceive of growth curves for attributes of the perceived environment in the same way as for attributes of personality or ability. A similar point has been made by Nesselroade and Baltes (1974) in relation to their concept of *environmental ontogeny*. We have selected one attribute from the

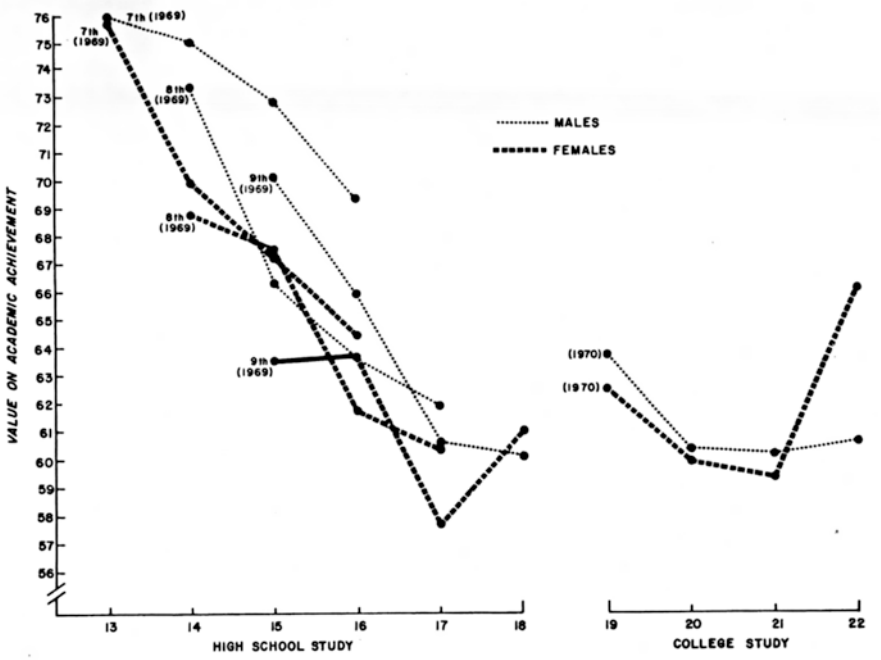

Fig. 10.3 Personality development in relation to age

proximal structure to illustrate development in the perceived environment. In Fig. 10.4, the data on perceived friends models for drinking are plotted for the combined high school males and the combined high school females. A highly significant increase in the perceived prevalence of drinking among friends is evident in the curves for both sexes over the four measurements. This measure and others suggest that, ontogenetically, the proximal environment becomes more approving of problem behavior and provides more models for it over time. Such environmental changes are, theoretically, in the direction of greater proneness toward problem behavior. These environmental trends are, therefore, fully consonant with those discussed earlier for personality.

In order to examine whether these trends are actually consonant with the expected increase in problem behavior during adolescence, we have plotted the marijuana behavior involvement scores for each cohort over the three years in which it was measured. Fig. 10.5 clearly shows that a significant increase in marijuana involvement does occur for all cohorts. The same data are plotted against age in Fig. 10.6, and the college study data are also included. Once again, an age-related developmental trend toward increased involvement with marijuana seems very apparent. These developmental increases in marijuana use are entirely consonant, theoretically, with the developmental changes noted above in the personality and perceived

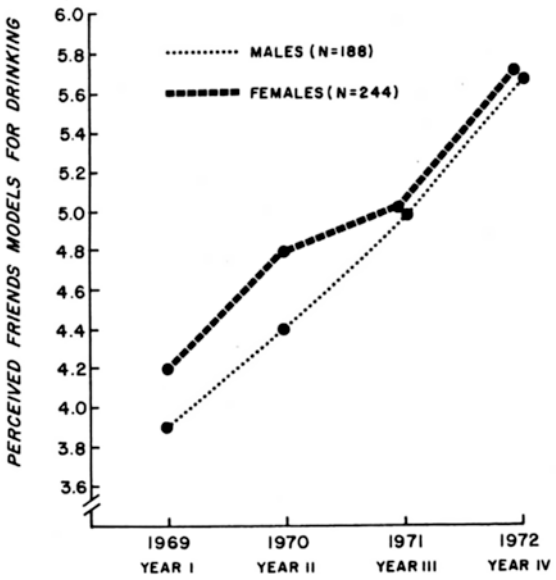

Fig. 10.4 Perceived environment development during adolescence in the High School Study

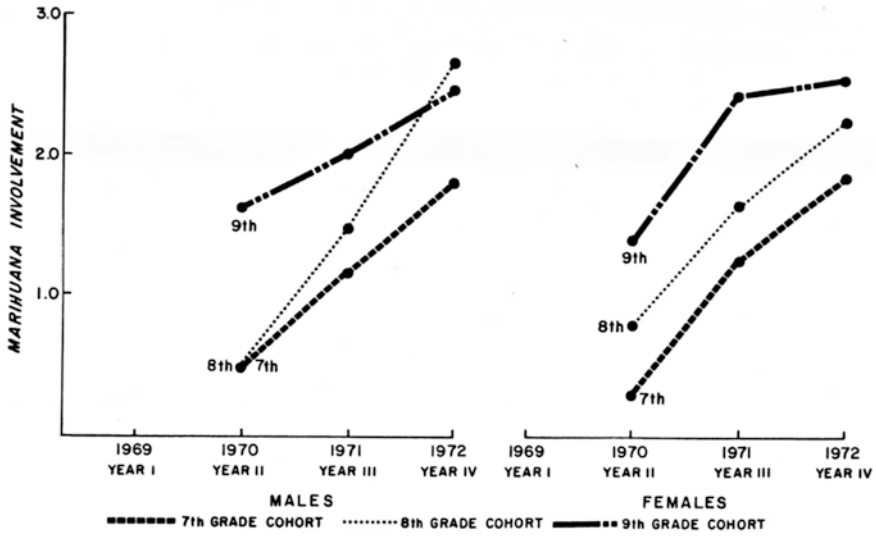

Fig. 10.5 Behavior development during adolescence in the High School Study

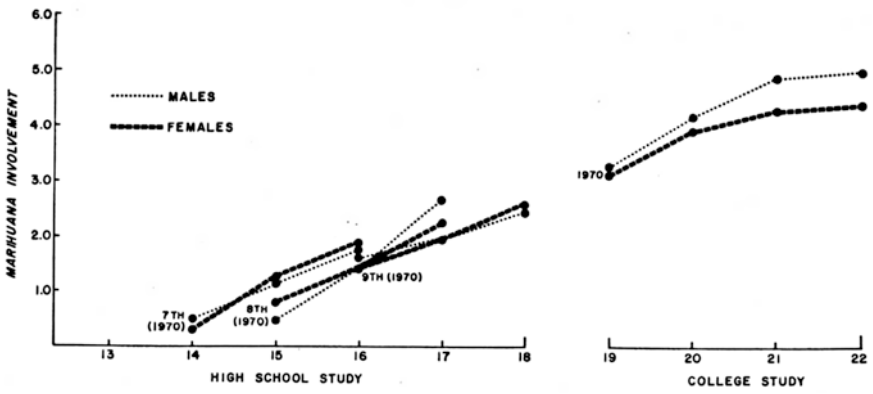

Fig. 10.6 Behavior development during adolescence in relation to age

environment predictors. The marijuana-use changes are themselves supported by other behavioral trends not illustrated here, for example, a significant developmental increase in deviant behavior and a significant developmental decline in church attendance.

There are two issues relevant to the interpretation of these changes that are discussed in detail in our book (Jessor, R., & Jessor, S. L., 1977) but which can only be noted here. First, there is the question of the adequacy of the measures for representing developmental change. Stability coefficients were computed for all measures over the three 1-year intervals and over the one 3-year interval; in general, temporal stability is satisfactory for a time interval of the length of a year, especially where scales have more than a few items. Second, there is the question of whether the changes simply reflect a repeated testing effect. In the absence of an untested control group, we have to seek to minimize this alternative inference on other grounds. Of interest here is the fact that Nesselroade and Baltes (1974), in a recent related study, did employ such a control; and they conclude for their data that "by and large, the longitudinal gradients of personality dimensions are not contaminated by…testing…effect" (p. 38). Further, the actual content of the developmental changes they observed are, in several instances, comparable to those reported here, for example, a decrement in superego strength and in achievement and an increase in independence.

Description of change as part of a longitudinal strategy for inference appears to permit the following conclusion: There is an evident developmental consonance between the changes observed in the personality and perceived environment systems on the one hand, and in the behavior system on the other. These theoretically parallel changes would seem to provide support, although indirect, for the developmental utility of Problem Behavior Theory. At the same time, and more specifically, they call attention to the variables that are likely to be relevant to changes in marijuana involvement.

Forecasting of Onset as Part of a Longitudinal Strategy

In the preceding strategy, it was possible to establish that changes do occur over time on the variables in the framework and to establish the direction of those changes, but it was not possible to establish a time lag between any of the changes. It is toward the latter objective that the present strategy is directed. Forecasting is a procedure that does incorporate a time lag, inasmuch as a temporally subsequent event is predicted on the basis of temporally antecedent information. A particularly compelling implementation of such a procedure would seem to be the forecasting of the initial appearance of an event or, in our terms, the onset of a new behavior. In the present context, we consider the onset of marijuana use.

The approach pursued was to establish three groups of students on the basis of their status as users or nonusers of marijuana in Years III and IV of the high school study. One group consisted of nonusers in Year III who remained nonusers in Year IV, that is, a no-onset group; a second group consisted of nonusers in Year III who became users by the Year IV testing, that is, an onset group; and a third group consisted of those who were users already in Year III, that is, a group that had experienced onset previously. By comparing the first two groups on their data in Year III when both were nonusers, it is possible to ascertain whether they differ in what we have defined as "transition proneness," namely a temporally antecedent pattern signaling a readiness to engage in transition-marking behavior. In evaluating differential transition proneness in the two groups, a reference standard is provided by the group that had begun use prior to Year III. The high school study data relevant to this analysis are presented in Table 10.7.

There is clear support in Table 10.7 for the predictive utility of the theoretical concept of transition proneness, and in that regard, these findings replicate an earlier analysis made of the Years I-II onset and described in R. Jessor, S. L. Jessor, & Finney (1973). The results are stronger and more consistent for the females than for the males, though support is present for both sexes. Those females who were nonusers in Year III, but who began marijuana use by Year IV, differ from the nonusers in Year III who remained nonusers by Year IV on a variety of theoretical attributes measured in Year III. They had significantly lower value on academic achievement; higher value on independence; higher value on independence relative to value on achievement; higher expectations for independence; higher alienation; greater tolerance of deviance; greater positive, relative to negative, functions for drinking, drugs, and sex; less parental support; less parent-friends compatibility; greater friends, relative to parents, influence; greater friends approval of and friends models for problem behavior; and greater general deviant behavior. Several other measures, for example, expectations for academic achievement and religiosity, while not significantly different, yield mean scores that are also in the theoretically expected direction. The pattern is pervasive and consistent. The Year-III mean scores of the group that will initiate in the subsequent year are, in almost every case, intermediate between the mean of the group that will not initiate and the mean of the group that had previously initiated. For the high school females, then, this analysis indicates

Table 10.7 Year III (1971) Mean Scores on Personality, Perceived Environment, and Behavior System Measures for Marijuana Nonusers Who Remain Nonusers by Year IV, for Marijuana Nonusers Who Begin Use by Year IV, and for Users in Both Years, in the High School Study

	Males ($N = 188$)					Females ($N = 244$)				
Measure	NU3-NU4 ($N = 115$)	NU3-U4 ($N = 24$)	U3-U4 ($N = 44$)	Onset *t*	*F*	NU3-NU4 ($N = 147$)	NU3-U4 ($N = 22$)	U3-U4 ($N = 73$)	Onset *t*	*F*
Personality System										
Motivational-instigation structure										
Value on academic achievement	69.8	68.2	57.2	0.4	7.6***	69.1	57.2	52.3	2.3*	19.4***
Value on independence	72.0	69.9	76.1	0.7	2.3†	73.4	77.8	75.4	−1.8†	1.3
Value on affection	65.1	64.3	59.2	0.2	1.8	71.0	67.3	63.4	0.9	5.2**
Independence achievement value discrepancy	92.1	91.7	108.9	0.1	13.4***	94.2	110.5	113.1	−3.0**	25.9***
Expectation for academic achievement	58.8	56.9	50.6	0.5	2.8†	59.4	54.5	47.3	0.9	10.2***
Expectation for independence	66.3	62.4	68.4	1.4	1.6	68.8	74.9	71.0	−2.3*	2.4†
Expectation for affection	56.1	57.9	53.6	−0.6	0.7	60.6	60.4	58.1	0.0	0.7
Personal belief structure										
Social criticism	28.6	29.0	32.8	−0.4	11.9***	30.3	30.4	32.7	−0.1	6.3**
Alienation	35.6	36.1	36.8	−0.5	0.7	35.1	38.4	36.2	−2.2*	3.1*
Self-esteem	29.6	29.1	29.7	0.7	0.2	29.4	30.7	29.6	−1.6	1.3
Personal control structure										
Tolerance of deviance	168.2	152.3	130.2	2.0†	18.5***	179.1	155.1	148.9	2.5*	16.3***
Religiosity	13.1	12.1	9.9	0.9	9.2***	14.4	12.3	10.9	1.7	17.3***
Drinking disjunctions	29.8	33.2	34.6	−1.6	4.0*	27.7	32.4	33.1	−1.7†	6.4**
Drug disjunctions	15.6	21.7	27.8	−2.8**	28.4***	15.5	23.6	28.6	−4.2***	55.1***

(continued)

Table 10.7 (continued)

Sex disjunctions	17.4	17.7	22.2	−0.2	8.2***	11.9	17.1	16.5	−4.6***	12.6***
Perceived Environment System										
Distal structure										
Parental support	7.5	6.9	6.6	1.7†	4.7*	7.6	6.7	6.7	1.7†	4.6*
Parental controls	6.3	6.5	5.6	−0.7	3.0†	6.1	6.1	5.9	0.1	0.3
Friends support	6.1	6.4	6.5	−0.9	1.4	7.4	7.5	7.9	−0.2	1.8
Friends controls	5.8	5.8	5.4	0.0	2.0	6.3	5.9	5.5	1.3	6.7**
Parent-friends compatibility	8.4	8.0	6.8	0.8	7.9***	9.1	7.4	6.5	3.0**	28.2***
Parent-friends influence	3.1	3.2	4.0	−0.5	12.6***	3.3	4.2	4.2	−3.2**	17.8***
Proximal structure										
Parent approval problem behavior	10.7	10.9	11.9	−0.4	4.2*	10.3	10.0	11.5	0.6	4.7**
Friends approval problem behavior	10.0	12.2	12.8	−4.7***	29.3***	9.8	11.7	12.8	−3.9***	38.0***
Friends models problem behavior	9.5	10.7	12.3	−3.6***	46.5***	10.2	11.1	12.9	−2.8**	56.9***
Behavior System										
General deviant behavior	35.6	40.1	45.8	−3.1**	37.6***	34.0	39.4	42.8	−3.1**	42.4***
Church attendance, past year	27.3	20.8	11.9	1.3	6.2**	32.3	33.8	14.8	−0.2	10.4***
Grade-point average	3.0	3.0	2.8	−0.5	1.8	3.1	2.8	2.7	1.5	11.0***

Note: All *t* tests are two tailed
†$p < .10$
*$p < .05$
**$p < .01$
***$p < .001$

the existence of a temporally prior pattern of attributes that constitutes a readiness to engage in transition-marking behavior, in this case the use of marijuana, and that signals a higher likelihood of its onset. The content of the pattern is similar to the content that emerged from the cross-sectional analyses of the differences between marijuana users and nonusers reported earlier in Tables 10.4 and 10.5.

The results for the high school males, while considerably weaker than they were for the previously reported Years I-II analysis, do indicate transition-proneness differences in the personal-control structure and, especially, in the proximal structure of the perceived environment. Similar analyses for the onset of other behaviors, such as beginning to drink and engaging in sexual intercourse, also provide strong evidence that measures antedating onset are predictive of its prospective occurrence among high school youth. When multiple regression analyses were run for the overall set of predictors in Year III against the dichotomous criterion of onset, versus no onset, of marijuana use by Year IV, the *R*s for females and males were .41 and .33, respectively. Though not accounting for very much of the variance, they are nevertheless significant.

Time of Onset and Course of Development as Part of a Longitudinal Strategy

The final strategy we discuss briefly, for it has been reported previously for both the onset of drinking (Jessor, R., & Jessor, S. L., 1975) and the onset of marijuana use (Jessor, R., 1976) among high school youth. The aim of the strategy is to show a further connection between changes in the theoretical attributes and the occurrence of problem behavior, in this case, marijuana use. More specifically, the strategy seeks to demonstrate that the course of social-psychological development during adolescence varies systematically, depending on whether and on when marijuana use begins. For this purpose, four groups of students were constituted: (1) *nonusers (N* = 258; 113 males and 145 females)—those students who reported no use of marijuana over the study years; (2) *initiates 1971–1972 (N* = 45; 24 males and 21 females)—those relatively late-onset students who began use of marijuana in the final year of the study; (3) *initiates 1970–1971 (N* = 48; 18 males and 30 females)—those relatively early-onset students who began use of marijuana a year earlier than the preceding group; and (4) *users (N* = 69; 26 males and 43 females)—those previous-onset students already using marijuana before the 1970 testing. Groups 1, 2, and 3 were all nonusers at the 1970 testing; Groups 2, 3, and 4 were all current users in 1972. When the developmental curves for the theoretical attributes are plotted for the four groups separately, it is possible to see the relation between time of onset of marijuana use and the course of social-psychological development.

In Fig. 10.7, the curves for the development of attitudinal tolerance of deviance over the four testing years in the high school study are presented (the higher the score, the greater the intolerance). The course of development of this attribute of

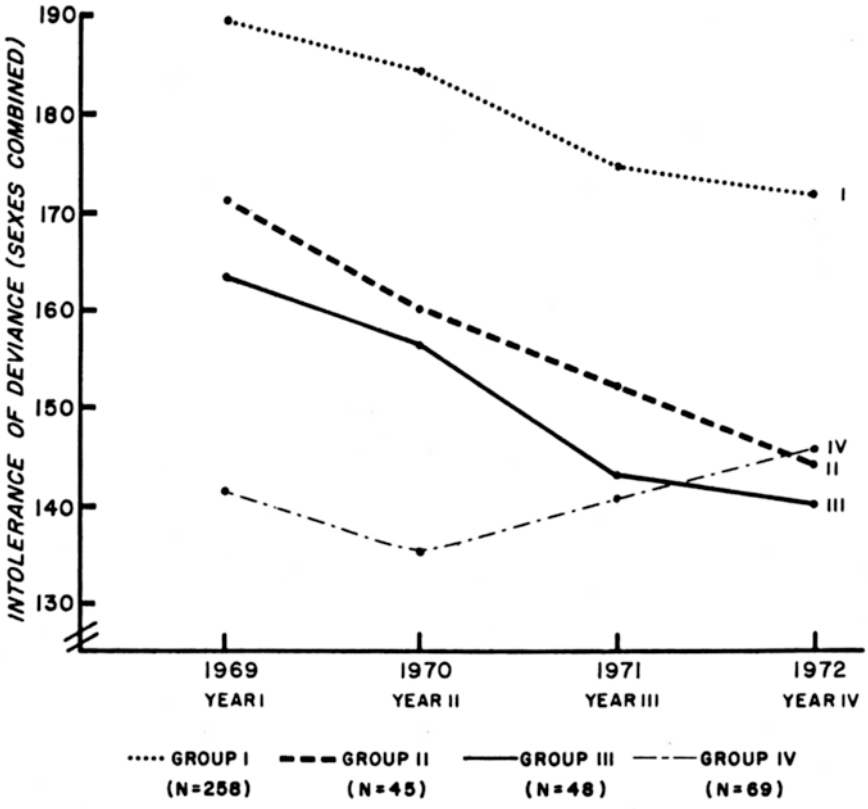

Fig. 10.7 Development of attitude toward deviance and the onset of marijuana use

the personal control structure varies as a function of whether and when marijuana onset took place. The nonusers were most intolerant in 1969 and remained most intolerant throughout; though declining in intolerance significantly over the years, they nevertheless were still less tolerant in 1972 than any of the other groups had been in 1969. The users were most tolerant of deviance in 1969, and they show no significant change on this measure over the years. The two groups that make the transition from nonuse to use are intermediate in tolerance of deviance at the outset, and both become significantly more tolerant by the end. What is especially interesting is that the two initiate groups, significantly more intolerant of deviance than the users in 1969, converge upon the users so that, by 1972, there is no difference between the means of the three groups, and all three means are significantly different from the mean of the nonusers in that year.

What this figure and others not shown here (see Jessor, R., 1976; Jessor, R., & Jessor, S. L., 1975, 1977) illustrate is a systematic relation between marijuana use

and social-psychological development. The curves represent interindividual differences in intraindividual developmental change as a function of time of onset of marijuana use. Unlike the logic of theoretically parallel change dealt with in an earlier section, the present developmental curves are tied directly to variation in behavior. Temporal priority here remains uncertain, however, although in many of the figures there is evidence of anticipatory psychological change in the year preceding the onset of marijuana use.

Discussion

It is apparent that a general strategy for longitudinal research may have a variety of components. We have emphasized six that have played a role in our own work, only three of which are uniquely dependent upon time-extended data, and there are others that will be mentioned in a moment. The rationale for this proliferation rests upon the point made earlier, that the compellingness of inference is largely a function of the convergence of multiple lines of evidence. In this chapter, we have introduced both cross-sectional and longitudinal lines of evidence—three kinds of the latter: descriptive, predictive, and associative. The convergence among these alternative analytic methods has been notable, providing considerable support for the relevance of Problem Behavior Theory as an explanatory framework for variation in marijuana use. The convergence is strengthened by the replications carried out across various samples at different times as well as by the fact that the measures employed were derived from the theory being tested.

It is only fair to say, however, that the causal texture of the relationships we have been dealing with remains very much a matter of presumption. None of our strategies, not even the prediction of onset where a time lag was involved, can do more than document an association and the temporal order of the events or processes involved. That the subsequent events were "produced" by those that were antecedent still eludes direct demonstration, and even if demonstrated, the possibility of the reverse direction in other samples at other times cannot be ruled out. For social-psychological concerns, such as those dealt with here, this latter point is of special importance. Given the nature of the processes involved, it would be strange indeed if causal influence could not in fact operate in different directions in different instances, for example, becoming more tolerant of deviance influencing the exploration of marijuana in one case, and the exploration of marijuana influencing a more tolerant attitude toward deviance in another. It may be that the preoccupation with univocal directionality of cause is an unwarranted legacy from experimental method in the physical sciences. In behavioral science, it may be preferable to adopt a network model of causal influence, with the possibility of traversing from one point to another by a variety of pathways and in alternative directions. In such a perspective, the critical question becomes the relevance of the network.

In establishing the relevance of a network, we have dealt with data obtained from several different procedures. More might have been mentioned. For example, an additional longitudinal strategy we employed focused on the socialization process that links parent with adolescent child. Although the actual data from parent and child were collected at the same time, the focus of the parent interview was on an earlier time than the measure of the child's behavior, and thus a longitudinal time interval was "constituted" between the two sets of data (see Jessor, S. L., & Jessor, R., 1974). A further strategy one of our colleagues has begun to explore with our data is the procedure of cross-lagged panel correlation. Because this is a developing strategy of interest, we present from Finney's work the cross-lagged panel correlations for the relation between attitudinal tolerance of deviance (a variable of the personal control structure in the Personality System) and marijuana behavior involvement. Because Kenny (1975) has suggested that a cross-lagged difference should ideally replicate across different time lags and different groups of subjects, the data in Fig. 10.8 are three-wave data for the high school males and females separately. The data suggest that the causal direction is from personality variable to behavior, from tolerance of deviance to marijuana involvement (results not supported, incidentally, at the college level). They provide one more indication of the relevance of the variables in the problem-behavior framework to marijuana involvement, that is, one more convergent strategy.

The emphasis on inference, whether to causality or to relevance, ought not to divert our attention from the importance of the sheerly descriptive information yielded by the time-extended observations. The data suggest important developmental regularities through the adolescent period in personality, the perceived environment, and behavior—regularities that reflect a developmental move away from conventionality. These regularities may, of course, be restricted to these samples or to this period of history; no claim is being made for them as developmental invariants. On the other hand, the trends observed are not at all inconsonant with descriptions of adolescence that transcend the most recent period of time. The general point we wish to stress is the value of longitudinal study for purposes of describing the natural course of psychosocial growth and development per se.

In the content of our findings, there is quite impressive coherence, whether considering the cross-sectional differences between marijuana users and nonusers, or the longitudinal predictive differences between those likely to begin use in the near future and those not, or the developmental convergence of new users with the characteristics of those already using. If a single summarizing dimension underlying the differences in personality were sought, it might be termed *conventionality-unconventionality.* The adolescent less likely to engage in marijuana use is one who values and expects to attain academic achievement, who is not much concerned with independence, who treats society as unproblematic rather than as an object for criticism, who maintains a religious involvement and a more uncompromising attitude toward normative transgression, and who sees little attraction in problem behavior relative to its negative consequences. The adolescent more likely to be involved with marijuana shows an opposite pattern: a concern with personal autonomy, a lack of interest in the goals of

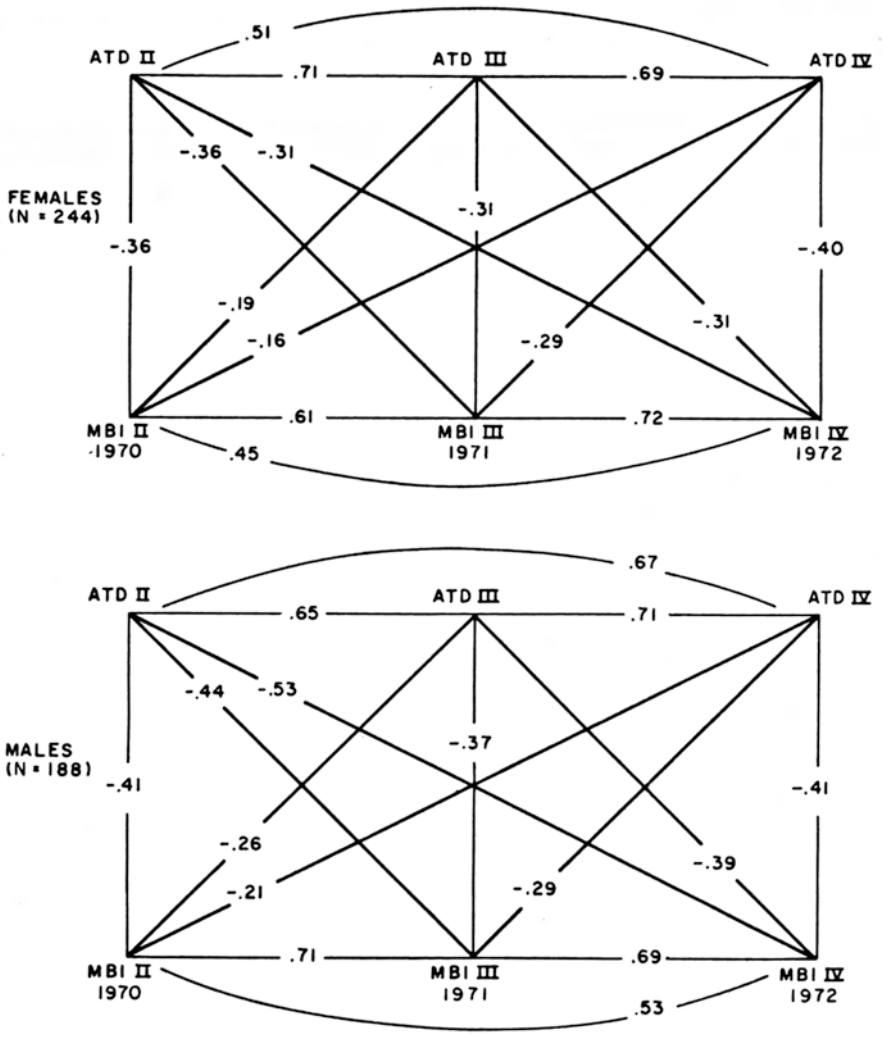

Fig. 10.8 Cross-lagged panel correlations for altitudinal tolerance of deviance (ATD) and marijuana behavior involvement (MBI) for Years II, III, and IV in the High School Study

conventional institutions like church and school, a jaundiced view of the larger society, and a more tolerant view of transgression.

In the environment, the youth likely to be involved with marijuana perceives less parental support, less compatibility between parents' and friends' expectations, greater influence of friends relative to parents, and greater friends support of and models for drug use. These variables reflect both the importance of whether the

reference orientation of a youth is toward parents or peers and the models and reinforcements available in the peer context (see also Kandel, 1973; Sadava, 1971). With respect to behavior, the adolescent likely to use marijuana is one likely to be more involved in other problem behaviors as well and to be less involved in conventional behavior than his or her non-drug-using counterpart.

The distinctions listed in the preceding paragraphs are not intended to be valuative. As a matter of fact, it is important to emphasize that the characteristics associated with use of marijuana in these samples of normal youth tend to be attributes associated with greater developmental maturity, for example, greater value on independence, greater tolerance of transgression, greater orientation to peers than parents.

The findings have been generally similar for both males and females, a fact worthy of emphasis. The similarity between high school and college youth, however, is attenuated, particularly in the Personality System and in the distal structure of the Perceived Environment System, suggesting that development is not homogeneous throughout the early-to-late stages of adolescence and youth. For college youth, among which the prevalence rate of drug use is relatively high, the important factors in marijuana use appear to be the immediate peer context. Personality factors, important for the adolescent at the high school level, play a far less important role among older youth. Of course, all of the generalizations we are making need to be restricted to our samples and not applied casually to the larger population from which they were drawn.

Overall then, Problem Behavior Theory has emerged as a useful explanatory framework both for marijuana use and for problem behavior more generally. The various research strategies reported in the chapter have yielded convergent support for the social-psychological formulations. They have documented their ability to account, in our samples, for a sizable portion of the variance in youthful drug use. While this convergence does strengthen our conviction about the relevance of the theoretical network, it still is not enough to sustain a claim for directly demonstrated causal influence. Such a causal claim, rather than following from strong tacit conviction, would seem to require a certain measure of hubris.

References

Blalock, H. M. (1964). *Causal inferences in nonexperimental research*. Chapel Hill: University of North Carolina Press.

Chase, J. A., & Jessor, R. (1977). *A social-psychological analysis of marijuana involvement among a national sample of adolescents* (Contract No. ADM 281-75-0028, pp. 1–99). Washington, DC: National Institute on Alcohol Abuse and Alcoholism.

Elder Jr., G. H. (1975). Age differentiation and the life course. *Annual Review of Sociology, 1*, 165–190.

Jessor, R. (1976). Predicting time of onset of marijuana use: A developmental study of high school youth. *Journal of Consulting and Clinical Psychology, 44*(1), 125–134.

Jessor, R., & Jessor, S. L. (1973a). Problem drinking in youth: Personality, social, and behavioral antecedents and correlates. In *Proceedings, Second Annual Alcoholism Conference*. NIAAA (pp. 3–23). Washington, DC: U.S. Government Printing Office.

Jessor, R., & Jessor, S. L. (1973b). The perceived environment in behavioral science: Some conceptual issues and some illustrative data. *American Behavioral Scientist, 16*(6), 801–828.

Jessor, S. L., & Jessor, R. (1974). Maternal ideology and adolescent problem behavior. *Developmental Psychology, 10*(2), 246–254.

Jessor, R., & Jessor, S. L. (1975a). Adolescent development and the onset of drinking: A longitudinal study. *Journal of Studies on Alcohol, 36*(1), 27–51.

Jessor, S. L., & Jessor, R. (1975b). Transition from virginity to nonvirginity among youth: A social-psychological study over time. *Developmental Psychology, 11*(4), 473–484.

Jessor, R., & Jessor, S. L. (1977). *Problem behavior and psychosocial development: A longitudinal study of youth*. New York: Academic Press.

Jessor, R., Graves, T. D., Hanson, R. C., & Jessor, S. L. (1968). *Society, personality, and deviant behavior: A study of a tri-ethnic community*. New York: Holt, Rinehart and Winston.

Jessor, R., Collins, M. I., & Jessor, S. L. (1972). On becoming a drinker: Social-psychological aspects of an adolescent transition. *Annals of the New York Academy of Sciences, 197*, 199–213.

Jessor, R., Jessor, S. L., & Finney, J. (1973). A social psychology of marijuana use: Longitudinal studies of high school and college youth. *Journal of Personality and Social Psychology, 26*(1), 1–15.

Kandel, D. (1973). Adolescent marijuana use: Role of parents and peers. *Science, 181*(4104), 1067–1070.

Kenny, D. A. (1975). Cross-lagged panel correlation: A test for spuriousness. *Psychological Bulletin, 82*(6), 887–903.

Nesselroade, J. R., & Baltes, P. B. (1974). *Adolescent personality development and historical change, 1970–1972*. Monographs of the Society for Research in Child Development, v. 39, no. 1, serial no. 154.

Neugarten, B. L., & Datan, N. (1973). Sociological perspectives on the life cycle. In P. B. Baltes & K. W. Schaie (Eds.), *Life-span developmental psychology: Personality and socialization* (pp. 53–69). New York: Academic Press.

Riley, M. W., Johnson, M., & Foner, A. (1972). *Aging and society: Vol.* 3. *A sociology of age stratification*. New York: Russell Sage Foundation.

Rohrbaugh, J., & Jessor, R. (1975). Religiosity in youth: A personal control against deviant behavior. *Journal of Personality, 43*(1), 136–155.

Sadava, S. W. (1971). A field-theoretical study of college student drug use. *Canadian Journal of Behavioural Science, 3*(4), 337–346.

Thomas, W. I. (1928). *The child in America: Behavior problems and programs*. New York: Alfred A. Knopf.

Weigel, R. H., & Jessor, R. (1973). Television and adolescent conventionality: An exploratory study. *Public Opinion Quarterly, 37*(1), 76–90.

Wohlwill, J. F. (1973). *The study of behavioral development*. New York: Academic Press.