

SELF-INITIATED CESSATION FROM SUBSTANCE USE: A LONGITUDINAL STUDY OF THE RELATIONSHIP BETWEEN POSTULATED MEDIATORS AND QUITTING

WILLIAM B. HANSEN, RALPH B. McNEAL, JR.

This study examines psychosocial predictors of self-initiated substance use cessation among youths who have had recent substance use experience. Variables included those that are the focus of many primary prevention programs. Middle school and high school students who used either alcohol, cigarettes, smokeless tobacco, marijuana, or inhalants were surveyed on two occasions, one year separating the pretest and posttest. Pretest differences distinguished those who would quit versus those who would continue using alcohol, tobacco, and marijuana, but not inhalants. The largest pretest differences were youths' normative beliefs, manifest commitments to not use substances, and perceived incongruence between drug use and their desired lifestyles. Those who continued to use had scale values for most mediators that continued to worsen in programmatic terms, whereas measures among those who quit significantly improved. School-aged users may benefit from programs that target some of the same mediators currently promoted as effective in primary prevention programs.

Researchers interested in adolescents have primarily focused attention on processes associated with experimenting with substances and becoming users. Moreover, the evaluation of programs designed to prevent onset or escalation of use predominate in the literature. However, it is clear there is a need to develop early intervention methods for those who have become users to encourage them to quit or

restrict their use of substances. Increasingly, there is a call for not only universal interventions, but those which are selected (for individuals who are at-risk) and indicated (for those who have started on the road to developing problem behaviors) as well (Mrztek & Haggerty, 1994). Indicated programs, those that target adolescent users and other indicated youth, have begun to be developed and evaluated (Dishion & Andrews, 1995; Eggert, Thompson, Herting, & Nicholas, 1994, 1995). However, it is clear that programmatic efforts are not always successful and are often difficult to launch and maintain.

SELF-INITIATED CESSATION

Recent attention has been given to understanding the patterns and processes that underlie self-initiated cessation. Epidemiologic studies that track youth into adulthood show evidence of widespread cessation or restrained use (Moffitt, 1993, 1997; Nagin, Farrington, & Moffitt, 1995; Nagin & Land, 1993). In fact, there are clear patterns that emerge when examining adolescents who begin substance use in early childhood (i.e. life-course persistent users) versus those who begin during middle-to-late adolescence (adolescent-limited users; Moffitt, 1997). It is unclear what contributes to cessation among those who are short-term users. However, longitudinal efforts suggest that there are several psychosocial processes including attitudes towards use and perceptions of disapproval of use that may be at work (Hansen, Collins, Johnson, & Graham, 1985; Sussman & Dent, 1999).

The primary model that speaks to cessation of behaviors is the Transtheoretical Model (Prochaska, DiClemente, & Norcross, 1992). According to this model, cessation is a process that starts with precontemplation, continues with contemplation, preparation, and action, and finally ends with maintenance of non-use. This stage model is highly useful in guiding program design in that it suggests different intervention activities are appropriate for different stages of behavior. This model has been successful in guiding the development of effective self-help programs (DiClemente & Prochaska, 1982; DiClemente et al., 1991; Pallonen et al., 1994). To date, only limited research attempts to catalog psychosocial characteristics (as opposed to stage marking characteristics) that can distinguish among people who are at the various stages within the model, most of which have been derived from cross-sectional studies (Snow, Prochaska, & Rossi, 1992).

THE RELATIONSHIP BETWEEN PREVENTION AND CESSATION

This research attempts to fill what we perceive as an important gap in the existent literature. In this paper we investigate the relationship between variables identified as likely candidates for intervention and substance use cessation among adolescents, with a focus on four of the most commonly used substances – alcohol, tobacco, marijuana, and inhalants. Specifically, we examine variables that have

already been examined as predictors of substance use onset to determine the degree to which these variables hold promise as candidates for cessation efforts.

At the outset, it is not clear the extent to which mediators that are predictive of substance use initiation will also be related to cessation. The recent emphasis on the distinction between indicated, selected, and universal programs (Mrazek & Haggerty, 1994) suggests that there should be distinctions in the variables that account for onset versus those that account for cessation. However, it is entirely possible that the same mediators that operate as essential ingredients for successful universal programs operate for selected and indicated populations as well. Parsimony would be introduced if programmatic strategies could be used for preventing initiation and further escalation as well as encourage cessation and restricted use of substances. In this study we wish to specifically understand the degree to which program elements that are normally targeted by primary prevention programs can also serve as the focus of secondary prevention efforts.

The focus of this research is on understanding the factors that determine success among those who manage their behavior without external intervention. This research is not specifically concerned with understanding intervention methods. However, it is likely that those who design programs may benefit from this research. Preventive interventions, particularly those aimed at indicated prevention, may augment their effectiveness if they can gain an understanding of natural processes that may be imitated or accelerated.

Research on cessation has found, not surprisingly, that current behavior is the primary predictor of future behavior. Frequency of use, length of time using, and regularity of use are all significant and strong discriminators of cessation versus continued use (Ary & Biglan, 1988; Hansen, 1983; Sussman, Dent, Severson, Burton, & Flay, 1998; Sussman & Dent, 1999). When entered in regression or structural models of cessation, current behavior often eliminates other psychosocial constructs (Sussman et al., 1998). Theoretical explanations of behavior cannot ignore prior behavior. Such findings often argue for early prevention. However, for program designers interested in indicated prevention this creates a conundrum. The need is for programs to address variables that can account for behaviors other than prior behavior, itself. Indeed, as noted above, it is only by changing mediators of behavior that programmatic outcomes in behavior itself can be achieved (Hansen & McNeal, 1996). If program design is limited to considering only prior behavior, indicated prevention approaches cannot be created. Thus, even though there is a justifiable scientific reason for accounting for prior drug use, such analytic practices may mask the potential of some mediating variables.

THE ROLE OF MEDIATING MECHANISMS

Increasingly, the design of prevention programs is being driven by our understanding of the role of mediators – variables that account for behavior and that

have the potential to be changed programmatically. Programs essentially work only when two conditions exist. First, programs must target variables that statistically account for desired changes in behavior. Second, programs must have a significant impact on these targeted mediators. Such an approach to program design restricts the selection of targets to only those mediators that show promise as having a strong statistical relationship with the outcome of interest (Hansen & McNeal, 1996; Hawkins, Catalano, & Miller, 1992). Useful theory will increasingly draw upon statistically promising mediators.

We recognize the importance and value of multivariate models for theory development and testing. In contrast, our approach in this paper is to consider mediators independently. This is driven by utilitarian constraints of program development. That is, even programs that ultimately try to change multiple mediators do so by changing one mediator at a time (Hansen, 1992). Program developers may focus the attention of program recipients on a constellation of mediator related topics, however, they do so in sequence. In essence, we believe that the independent consideration of mediating variables will provide the cumulative information that program designers need to fashion programs that will have maximized potential to achieve behavior-change goals. We have recently applied this method to understanding the role of mediators targeted for intervention in universal and primary prevention programs (McNeal & Hansen, 1999).

It is rare for cessation research to focus on multiple substances. Previous research has focused on those constructs or mediators believed to have a significant impact on preventing adolescent substance use (e.g. Hansen, 1992; Hansen & Graham, 1991; Hansen & McNeal, 1997; Hawkins, Catalano, & Miller 1992; MacKinnon, 1994; MacKinnon et al., 1991). Nonetheless, there is increasing evidence that similar psychosocial processes operate as etiologic factors for several drugs. For example, it is well established that there are commonalities in factors that predict onset for several substances (Derzon & Lipsey, 1999; McBride et al., 1994). Likewise, prevention approaches that address multiple substances often share similar approaches and methods (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995; Hansen & Graham, 1991; Hansen, Johnson, Graham, Flay, & Sobel, 1988; Pentz et al., 1989). However, much less is known about the commonalities that exist among substances when it comes to cessation, especially self-initiated cessation during adolescence.

Given these conclusions, this research investigates the relationship between key mediating variables and substance use cessation among adolescents. We focus on multiple types of substance use (alcohol, tobacco, marijuana, and inhalants) and attempt to document the similarities and differences in twelve postulated mediators. It is likely that if there are different variables associated with cessation than with initiation and these differences may prove especially fruitful for prevention efforts.

SELF-INITIATED CESSATION FROM SUBSTANCES USE

METHODS

SUBJECTS AND SETTING

Table 1 presents the overall design of the project from which subjects were identified. All students enrolled in public middle and high schools in Forsyth County, North Carolina were invited to participate in surveys administered on a yearly basis. Numbers of students surveyed each year were: 5,715 (year 1), 10,503 (year 2), 8,249 (year 3), 8,355 (year 4) and 8,394 (year 5). Subjects were included in analyses once the following conditions were met. First, only students who had measurements in at least two consecutive years were included. Second, only students who reported drug use during the past 30 days of their initial measure were included. Third, only one linkage was kept for each student. When there were data for more than two consecutive years, only the latest match (i.e. 11th-12th first, followed by 10th-11th, etc., in order) was retained.

The above criteria were applied across four separate categories of substance use, alcohol, tobacco (including cigarettes and chewing tobacco), marijuana, and inhalants. Measures were obtained on amphetamines, hallucinogens, cocaine and

TABLE 1
MEASUREMENT DESIGN
GRADE OF MEASUREMENT BY YEAR OF THE STUDY

Cohort	Year 1	Year 2	Year 3	Year 4	Year 5
Class of 1993		11 th	12 th		
Class of 1994	9 th	10 th	11 th	12 th	
Class of 1995	8 th	9 th	10 th	11 th	12 th
Class of 1996	7 th	8 th	9 th	10 th	11 th
Class of 1997	6 th	7 th	8 th	9 th	10 th
Class of 1998		6 th	7 th	8 th	9 th
Class of 1999			6 th	7 th	8 th
Class of 2000				6 th	7 th

crack, heroin, and steroids, but were not included in analysis due to insufficient numbers of users. Details about the sample are presented in Table 2. For alcohol, tobacco, and marijuana users, ninth graders were the single most prevalent group. For inhalant users, the most prevalent group were seventh graders. Otherwise, alcohol drinkers and cigarette smokers were roughly evenly distributed among grades. The sample of marijuana users tended to be slightly older as a group and the inhalant users tended to be slightly younger as a group. There was also a fair degree of multiple drug use among the sample. Marijuana and inhalant users tended to be involved more heavily in other drug use than alcohol drinkers and cigarette smokers (Kandel, Yamaguchi, & Chen, 1992).

MEASURES

In addition to drug use, surveys asked students to respond to questions that assessed twelve variables postulated to mediate substance use. The twelve mediators, derived from Hansen's (1992) typology of variables targeted by existing prevention programs, include Beliefs about Consequences, Decision Making Skills, Goal Setting Skills, Self-esteem, Stress Management Skills, Social and Life Skills, Perceived Alternatives to Drug Use, Assistance Skills, Resistance Skills, the incongruence between lifestyle and values and substance use (Lifestyle Incongruity), manifestations of a commitment to not use substances (Manifest

TABLE 2
SAMPLE CHARACTERISTICS (PERCENTAGES)

Sample Group	Alcohol	Tobacco	Marijuana	Inhalants
N	3,045	1,894	529	482
Percent Male	48.9	47.8	57.3	56.0
Percent of the Sample Group with Baseline Use of:				
Alcohol		88.2	96.2	86.5
Tobacco	62.5		86.0	75.5
Marijuana	34.0	43.8		49.0
Inhalants	19.9	26.0	37.6	
Percent Enrolled in Each Grade at Baseline:				
6 th	10.0	8.9	4.0	14.7
7 th	19.4	19.6	12.7	28.4
8 th	19.3	19.2	13.6	25.5
9 th	25.6	25.6	28.7	19.1
10 th	13.0	13.0	20.0	6.8
11 th	12.7	13.7	21.0	5.4

SELF-INITIATED CESSATION FROM SUBSTANCES USE

Commitment), and Normative Beliefs. Where appropriate (e.g. Resistance Skills, Beliefs about Consequences, Normative Beliefs, etc.) items included either tobacco, alcohol, marijuana, or cocaine as substantive examples. Such scales typically varied the references to substances among items so that no scale focused exclusively on any given drug.

Postulated mediating variable scales were created by standardizing individual self-report items with means of zero and standard deviations of one and then averaging across items to create scales. Average scores were linearly adjusted for each scale so that the lowest value was 0 and the highest value was 10. All scales were oriented so that higher values represented more socially desirable outcomes. Thus, higher scores on Beliefs about Consequences reflected a greater belief that negative outcomes would result from drug use. Similarly, higher scores on the Normative Beliefs scale reflected a more conventional belief in the norm (less prevalence and less acceptability). Internal consistency (Cronbach alpha) for all mediating variables was above 0.60 and was observed for this sample as follows: Beliefs about Consequences ($\alpha = 0.68$; 8 items), Manifest Commitment ($\alpha = 0.66$; 4 items), Decision Making Skills ($\alpha = 0.70$; 4 items), Lifestyle Incompatibility ($\alpha = 0.69$; 4 items), Goal Setting Skills ($\alpha = 0.78$; 6 items), Stress Management Skills ($\alpha = 0.76$; 4 items), Self-esteem ($\alpha = 0.79$; 5 items), Resistance Skills ($\alpha = 0.80$; 4 items), Social and Life Skills ($\alpha = 0.64$; 5 items), Normative Beliefs ($\alpha = 0.89$; 8 items), Assistance Skills ($\alpha = 0.71$; 5 items), and Perceived Alternatives to Substance Use ($\alpha = 0.63$; 7 items).

RESULTS

PRETEST DIFFERENCES

Pretest differences in the frequency of use existed between quitters and continuing users for all substances except inhalants. Quitting cigarette smoking was most strongly predicted from pretest frequency of use values ($r = -0.348$). Quitting alcohol use ($r = -0.265$) and marijuana use ($r = -0.185$) were also reasonably well predicted by pretest frequency measures. Quitting inhalant use ($r = -0.160$) and smokeless tobacco use ($r = -0.068$) were both poorly predicted from pretest consumption levels.

Different numbers of mediators distinguished between continuing users and quitters for each substance (see Table 3). Nine of twelve mediators were significantly different for continuing alcohol users versus those who quit. Seven mediators of tobacco use were different at pretest for continuing users versus quitters. Only three mediators differentiated between marijuana users who quit versus those who continued. There were no pretest differences among inhalant users who quit versus those who continued.

For all three substances for which there were pretest differences, the three strongest predictors of quitting followed in the same order. The strongest predictors

TABLE 3
PRETEST EFFECT SIZE DIFFERENCES BETWEEN STUDENTS
WHO REMAINED DRUG USERS AND WHO QUIT

	Alcohol	Tobacco	Marijuana	Inhalants
Normative Beliefs	-0.38*	-0.21*	-0.11*	0.04
Manifest Commitment	-0.50*	-0.25*	-0.21*	-0.03
Lifestyle Incongruence	-0.43*	-0.24*	-0.12*	0.01
Beliefs about Consequences	-0.33*	-0.13*	-0.04	-0.06
Resistance Skill	-0.27*	-0.05	-0.05	-0.02
Goal Setting Skill	-0.22*	-0.10*	-0.07	-0.03
Self-Esteem	-0.13*	-0.12*	0.05	-0.16
Social Skill	0.13*	0.04	0.08	0.10
Decision Making Skill	-0.08	-0.03	-0.04	0.01
Stress Management Skill	-0.07	-0.03	0.02	-0.00
Alternatives	-0.06*	-0.08*	-0.03	-0.04
Assistance Skill	0.06	0.01	-0.01	0.09

of cessation were Manifest Commitment to avoid substance use, followed by perceiving the use of the substance to not fit with one’s desired lifestyle (Lifestyle Incongruence), and Normative Beliefs about substance use. For alcohol, self-efficacy to resist peer pressure (Resistance Skill), skill at setting and achieving goals (Goal Setting Skill), and having better Self-esteem were significant but less important predictors of quitting. Goal Setting Skills and positive Self-esteem were secondary predictors of quitting tobacco use. Finally, having access to Alternatives was a significant but weak predictor of quitting the use of both alcohol and tobacco.

One counter-intuitive finding emerged, however. Having fewer Social Skills was more important as a predictor of quitting alcohol use, suggesting that those who had better social skills were more likely to continue drinking.

PRETEST-POSTTEST CHANGES

Continuing users and quitters often changed in different directions between the pretest and posttest. Table 4 portrays pretest-posttest changes in mediators for alcohol users. For several key variables, notably Normative Beliefs, Manifest Commitment, Lifestyle Incongruence, and Beliefs about Consequences, continuing drinkers had a general erosion of these measures. The Normative Beliefs of continuing drinkers became more unconventional; they increasingly believed that

SELF-INITIATED CESSATION FROM SUBSTANCES USE

substance use was common and acceptable. Drinkers' commitment to avoid substance use decreased. Drinkers' desired lifestyles increasingly became one that fit with alcohol and drug use and was not expected to result in negative personal or social consequences.

In contrast, those who quit drinking significantly improved on ten of the twelve mediators. The greatest improvement was seen for ability to resist peer pressure (Resistance Skill). Perceptions that drinking did not fit with a desired lifestyle and commitment to avoid substance use were also important qualities that improved between the pretest and posttest.

Table 5 presents changes over time for tobacco users. The pattern of change for continuing tobacco users is similar to that of continuing drinkers. Beliefs about social norms regarding substance use become more unconventional. Commitment to avoid drug use weakened. Perceptions changed such that one's desired lifestyle

TABLE 4
MEAN SCORES IN PRETEST AND POST-TEST GRADES COMPARING STUDENTS
WHO USED ALCOHOL AT PRETEST

Construct	Continuing-Users (N=2,196)			Quitters (N=849)		
	Pre	Post	ES	Pre	Post	ES
Normative Beliefs	6.43	5.76	-0.54*	7.09	7.31	0.17*
Manifest Commitment	6.41	5.92	-0.33*	7.36	7.67	0.24*
Lifestyle Incongruence	7.05	6.51	-0.38*	7.88	8.39	0.38*
Beliefs about Consequences	7.89	7.52	-0.39*	8.30	8.48	0.20*
Resistance Skill	7.16	7.22	0.04	7.70	8.37	0.47*
Goal Setting Skill	5.99	5.95	-0.03	6.34	6.48	0.12*
Self-Esteem	6.89	6.94	0.08*	7.05	7.25	0.19*
Social Skill	7.98	8.01	0.04	7.82	7.92	0.11*
Decision Making Skill	5.61	5.58	-0.02	5.75	5.95	0.14*
Stress Management Skill	6.22	6.25	0.03	6.35	6.58	0.17*
Alternatives	6.53	6.46	-0.09*	6.60	6.61	0.00
Assistance Skill	3.78	3.84	0.07*	3.69	3.66	-0.02

became more congruent with substance use. Continuing users believed that negative social and psychological consequences of substance use would not occur.

On the other hand, those who quit using tobacco improved on a number of dimensions. They increasingly viewed substance use as at odds with the kind of lifestyle they desired to live. They became more personally committed to avoiding substance use. They also developed skills for resisting peer pressure and began to see that social and psychological consequences of using were more likely to occur to them. It is interesting that beliefs about peer group norms became more conventional, but only slightly. Students who quit using tobacco perceived their skills for managing stress improved. The Self-esteem of those who quit using tobacco also improved, although continuing users also had an increase in self-esteem, which complicates the interpretation of these findings. Social skills improved for both groups.

The largest pretest-posttest changes observed for marijuana users related to Lifestyle Incongruence (see Table 6). Continuing marijuana users viewed substance use as increasingly fitting with their desired lifestyle whereas those who quit moved away from such an attitude. Continuing marijuana users also felt less inclined to believe that negative social and psychological consequences would

TABLE 5
MEAN SCORES IN PRETEST AND POST-TEST GRADES COMPARING STUDENTS
WHO USED TOBACCO AT PRETEST

Construct	Continuing-Users (N=1,331)			Quitters (N=563)		
	Pre	Post	ES	Pre	Post	ES
Normative Beliefs	6.07	5.49	-0.46*	6.74	6.90	0.13'
Manifest Commitment	5.80	5.28	-0.35*	6.69	7.19	0.35'
Lifestyle Incongruence	6.45	5.89	-0.37*	7.32	7.94	0.44'
Beliefs about Consequences	7.66	7.29	-0.37*	7.98	8.24	0.28'
Resistance Skill	7.00	7.05	0.03	7.21	7.99	0.49'
Goal Setting Skill	5.83	5.78	-0.05	6.13	6.22	0.08
Self-Esteem	6.55	6.68	0.11*	6.91	7.14	0.21'
Social Skill	7.90	8.00	0.11*	7.81	7.93	0.12'
Decision Making Skill	5.45	5.41	-0.03	5.54	5.81	0.19'
Stress Management Skill	5.88	5.97	0.06	5.99	6.29	0.21'
Alternatives	6.35	6.26	-0.10*	6.51	6.57	0.07
Assistance Skill	3.83	3.87	0.04	3.79	3.75	-0.04

SELF-INITIATED CESSATION FROM SUBSTANCES USE

attend continued use whereas those who quit using marijuana were more likely to believe such consequences might happen.

Several changes in mediators related to marijuana use showed evidence of a somewhat different pattern of change compared to the pattern that had been observed for alcohol and tobacco use. For example, the average Normative Belief scores of marijuana users were less than 5 (on the 0 to 10 scale) compared to scores between 6 and 7 that had been observed for continuing alcohol and tobacco users. Perhaps there was little erosion among continuing users in part because the Normative Beliefs of these students were already so unconventional. In contrast, where small shifts toward conventionality had been observed among alcohol and tobacco quitters, there was a relatively large shift towards conventionality among those who quit using marijuana; quitters perceived drug use to be less prevalent and less acceptable to their peer group.

Among continuing users there was essentially no change in expressed commitments, however, there was a marked increase in commitment to avoid substance use among marijuana users who quit. There was similarly an increase in perceptions of alternatives to drug use for those who quit using marijuana but no change among those who continued to use. It was interesting that among both

TABLE 6
MEAN SCORES IN PRETEST AND POST-TEST GRADES COMPARING STUDENTS
WHO USED MARIJUANA AT PRETEST

Construct	Continuing-Users (N=345)			Quitters (N=184)		
	Pre	Post	ES	Pre	Post	ES
Normative Beliefs	4.81	4.61	-0.16*	5.13	6.24	0.73*
Manifest Commitment	5.01	5.03	0.01	5.74	6.58	0.56*
Lifestyle Incongruence	5.58	5.17	-0.29*	5.99	7.32	0.91*
Beliefs about Consequences	6.83	6.62	-0.21*	6.92	7.78	0.70*
Resistance Skill	6.46	6.73	0.16*	6.67	7.98	0.70*
Goal Setting Skill	5.52	5.68	0.15	5.73	6.12	0.30*
Self-Esteem	6.63	6.88	0.22*	6.46	7.19	0.53*
Social Skill	8.05	8.04	-0.02	7.86	7.98	0.11
Decision Making Skill	5.17	5.23	0.04	5.28	5.74	0.32*
Stress Management Skill	6.03	6.39	0.24*	5.95	6.51	0.40*
Alternatives	6.12	6.09	-0.04	6.18	6.40	0.26*
Assistance Skill	3.90	3.79	-0.11	3.92	3.74	-0.15

continuing marijuana users and those who quit that self-esteem and stress management skills improved from the pretest to the posttest. The improvements were greater for quitters than continuing users.

Between the pretest and the posttest inhalant users also made significant changes (see Table 7). Continuing users increasingly viewed substance use as common and acceptable among their peers. Commitments to avoid substance use eroded as did their perception that substance use would interfere with their desired lifestyles and the Beliefs about Consequences associated using substances. On the other hand, those who quit using inhalants between the pretest and the posttest made significant improvements on 11 of the 12 mediators. The greatest improvement in effect size terms was in their ability to resist peer pressure (Resistance Skill). There were also relatively large improvements in Lifestyle Incongruence, Self-esteem, and Goal Setting Skills with more modest improvements in Decision Making Skills, understanding Alternatives, Normative Beliefs, Social Skills, Beliefs about Consequences, and Manifest Commitment to avoid substance use.

DISCUSSION

These results suggest that there are specific qualities that distinguish those who are successful at self-initiated cessation from those who are not. It should be noted as a caveat that successful quitting was not defined by self-reported quit status, but by inferred non-use status. Thus, this methodology does not account for those who

TABLE 7
MEAN SCORES IN PRETEST AND POST-TEST GRADES COMPARING STUDENTS
WHO USED INHALANTS AT PRETEST

Construct	Continuing- Users (N=133)			Quitters (N=349)		
	Pre	Post	ES	Pre	Post	ES
Normative Beliefs	6.06	5.41	-0.45*	5.99	6.41	0.30*
Manifest Commitment	6.13	5.59	-0.33*	6.21	6.57	0.23*
Lifestyle Incongruence	6.32	5.70	-0.37*	6.29	6.93	0.42*
Beliefs about Consequences	7.25	6.94	-0.28*	7.35	7.67	0.27*
Resistance Skill	6.26	6.15	-0.05	6.30	7.31	0.54*
Goal Setting Skill	5.59	5.39	-0.18	5.63	6.11	0.38*
Self- Esteem	6.08	6.24	0.12	6.41	6.93	0.42*
Social Skill	7.86	7.73	-0.14	7.72	7.98	0.27*
Decision Making Skill	5.14	5.04	-0.08	5.11	5.61	0.34*
Stress Management Skill	5.60	5.80	0.14	5.60	6.21	0.39*
Alternatives	6.18	6.22	0.04	6.23	6.52	0.34*
Assistance Skill	3.96	3.84	-0.11	3.82	3.85	0.02

SELF-INITIATED CESSATION FROM SUBSTANCES USE

may have attempted to quit but were ultimately unsuccessful. It furthermore does not assume that quitting was a conscious and deliberate act as has often been assumed as part of formal cessation programs. Nonetheless, the emergence of distinctive pre-quit and post-quit changes in several hypothesized mediators suggests that, at a minimum, distinctive elements of self-initiated quitting among adolescents was observed and can be modeled.

These data speak to several stages of cessation as conceptualized by the Transtheoretical Model: Contemplation and Maintenance (Prochaska et al., 1992). Notably, these data are indicative of differences between probable non-contemplators, contemplators and maintainers.

CONTEMPLATING CESSATION

The Contemplation Stage is characterized by increasing motivation and the consideration of intentions. We note that the largest observed pretest difference between those who would ultimately succeed at quitting and those who would continue to use was a difference in the manifest commitment of those who would quit to maintain themselves as drug-free. That is, they were generally more willing to agree that their intentions were to not use drugs. This was true for alcohol, tobacco, and marijuana, suggesting that for these common gateway drugs, the same process may be at work. However, along with a bolstering of commitment, there also appeared to be a distinctive perception that substance use did not fit with desired lifestyles and violated acceptable social norms. This was particularly true for alcohol and tobacco use. There was also a perception among those who would quit using alcohol and tobacco that they would experience more negative and fewer positive social and psychological consequences. We conclude that the process that leads young people to initiate cessation may be primarily motivational in nature. The factors that produce motivation may be strongly influenced by the creation of social and intrapsychic dissonance which may be important to sustaining the quitters intentionality.

Other pretest measures that distinguished continuing from quitting alcohol and tobacco users included having better goal setting skills, better self-esteem, and a perception that they had access to alternatives to using these substances for fulfilling personal needs. The effect sizes for each of these were relatively small, suggesting that they might either be not essential to the process of initiating cessation, or that they may accompany the more important motivational developments noted above. For example, it may be that those who are motivated or inclined to quit smoking and drinking also have confidence they can accomplish the task with relative ease. It is unclear that such confidence is a prerequisite for improving motivation. It may develop independently or as a consequence of having developed sufficient motivation to desire to quit.

Having improved social skills was a significant detriment to quitting. This was only significant for those continuing to use alcohol but was in the same direction for tobacco, marijuana and inhalants. Apparently, those who continue using these substances had generally better skills for making friends and getting along with peers and may have even used substances as a means of augmenting these social skills. It may also be true that those who are about to quit may feel a deficit in social skills because that they may feel at odds with their peer group, particularly if that peer group has a favorable attitude towards drug use. Possessing good social skills has been identified in other studies as being a liability for increased gateway substance use (Derzon & Lipsey, 1999).

MAINTAINING CESSATION

Once cessation had been achieved, there were a large number of differences that became apparent. Overall, the greatest change among those who were successful in quitting were apparently large increases in their ability to refuse offers to use substances. This was true for all those who quit all four substances. Once an individual successfully quits – but apparently not before – the ability to deal with overt social pressures and opportunities to use substances improves dramatically. In the case of those who continue to use, the ability to refuse offers does not change, or in the case of marijuana users, apparently worsens. Teaching resistance skills was originally used as a universal prevention technique but met with mixed results (Donaldson, Graham, & Hansen, 1994; Hansen & Graham, 1991). It may be more appropriate to focus on teaching resistance skills to those who have recently quit as a maintenance strategy (Marlatt, 1996).

The trend for quitters to improve on variables associated with motivation – commitment, beliefs about consequences, normative beliefs, and perceived lifestyle incongruence – while scores on these variables deteriorated suggests that these variables reflect dynamic processes that continue throughout the developmental courses of substance use uptake and cessation. The same improvements in motivation that might induce attempts at cessation may be similarly important to continue once cessation has been achieved. Because there was a full year between assessments, it is not clear whether improvements among those who quit occurred just prior to cessation or followed once cessation had been achieved. Nonetheless, the programmatic implications remain clear. Addressing drug attitudes is as important as addressing skills for resisting social pressures.

For each of the substances, there were significant improvements in a variety of skills – goal setting skills, decision making skills, stress management skills, and self-esteem, which might be viewed as a general affect management skill. The degree of observed improvement among those who quit and the relative lack of change among those who continued to use suggests that these skills may be valuable

SELF-INITIATED CESSATION FROM SUBSTANCES USE

to quitters. The magnitude of change observed was smaller for these variables than for refusal skills and for motivation, however, suggesting a secondary role for such variables. Programs that addressed young people who have recently quit may find small but meaningful benefit to including training in these skills.

Social skills also improved for quitters of all four substances. However, social skills also improved for continuing alcohol and tobacco users. Social skills clearly deteriorated only for continuing inhalant users suggesting that this group began to experience significantly less social acceptance generally as they continued to use inhalants. Except for continuing inhalant users who may develop true social pathologies, nearly all young people improve their social skills over time, learning to fit within social groups of various orientations. To the extent that social skills reflect that ability to understand the norms of a group, it is reasonable to expect that those who become more integrated with either drug-using or non-using groups will report increased friendship and acceptance by their respective groups over time. Perhaps the key social skills those who quit may need to master is the ability to understand and adopt the general normative practices of groups who are defined by their non-use status.

CONCLUSION

The results of this study suggest that programming to aid with cessation among indicated populations may benefit from targeting specific mediators in a staged approach. Interventions might profitably target changing normative beliefs, increase dissonance between desired lifestyles and likely life outcomes with continued use, and strengthen personal commitments to quit using substances. Even though it is clear that the target of such interventions may be a high-risk sub-group of individuals within a school or other youth population, it might also be appropriate to address such variables within a broader context as well as through individual- or sub-group-targeted interventions.

Encouraging attempts at self-initiated cessation should be viewed distinctly from supporting those who have already quit. Indicated prevention programs as they are currently framed may not consider targeting interventions to those who have recently quit using a substance. However, it is clear that there may be significant benefit to doing so. The results observed from this study suggest it is primarily during or after quitting when adolescents would benefit from training in skills for resisting peer pressure, and skills for managing stress, for setting goals, for making better decisions, and for improving one's self image.

ACKNOWLEDGMENTS

This project was supported in part by a grant from the National Institute on Drug Abuse, grant number 1-R01 DA07030.

REFERENCES

INSERT ARY & BIGLAM, 1988

Botvin, G.J., Baker, E., Dusenbury, L., Botvin, E.M., & Diaz, T.

1995 Long-term follow-up results of a randomized drug abuse prevention trial in a white middle-class population. *Journal of the American Medical Association*, 273, 1106-1112.

Derzon, J.H., & Lipsey, M.W.

1999 A synthesis of the relationship of marijuana use with delinquent and problem behaviors. *School Psychology International*, 20, 57-68.

DiClemente, C.C., & Prochaska, J.O.

1982 Self-change and therapy change of smoking behavior: A comparison of processes of change in cessation and maintenance. *Addictive Behaviors*, 7, 133-142.

DiClemente, C.C., Prochaska, J.O. Fairhurst, S.K., Velicer, W.F., Velasquez, M.M., & Rossi, J.S.

1991 The process of smoking cessation: An analysis of precontemplation, contemplation, and preparation stages of change. *Journal of Consulting and Clinical Psychology*, 59, 295-304.

INSERT DISHION & ANDREWS, 1995

Donaldson, S.I., Graham, J.W., & Hansen, W.B.

1994 Testing the generalizability of intervening mechanism theories: Understanding the effects of adolescent drug use prevention interventions. *Journal of Behavioral Medicine*, 17, 195-216.

Eggert, L.L., Thompson, E.A., Herting, J.R., Nicholas, L.J., & Dicker, B.G.

1994 Preventing Adolescent Drug Abuse and High School Dropout Through an Intensive School-Based Social Network Development Program. *American Journal of Health Promotion*, 8, 202-215.

Eggert, L.L., Thompson, E.A., Herting, J.R., & Nichols, S.E.

1995 Reducing Suicide Potential Among High-Risk Youth: Tests of a School-Based Prevention Program. *Suicide and Life-Threatening Behavior*, 25, 276-296.

Hansen, W.B.

1983 Behavioral predictors of abstinence: Early indicators of a dependence on tobacco among adolescents. *International Journal of the Addictions*, 18(7), 913-920.

Hansen, W.B.

1992 School-based substance abuse prevention: A review of the state of the art in curriculum 1980-1990. *Health Education Research*, 7(3), 403-430.

Hansen, W.B., Collins, L.M., Johnson, C.A., & Graham, J.W.

1985 Self-initiated smoking cessation among high school students. *Addictive Behaviors*, 10, 265-271.

SELF-INITIATED CESSATION FROM SUBSTANCES USE

Hansen, W.B., & Graham J.W.

1991 Preventing alcohol, marijuana, and cigarette use among adolescents: Peer pressure resistance training vs. establishing conservative norms. *Preventive Medicine, 20*, 414-430.

Hansen, W.B., Johnson, C.A., Flay, B.R., Graham, J.W., & Sobel, J.L.

1988 Affective and social influences approaches to the prevention of multiple substance abuse among seventh grade students: Results from Project SMART. *Preventive Medicine, 17*, 1-20.

Hansen, W.B., & McNeal, R.B.

1996 Law of maximum expected potential effect: constraints placed on program effectiveness by mediator relationships. *Health Education Research, 11(4)*, 501-507.

Hansen, W.B., & McNeal, R.B.

1997 How D.A.R.E. works: An examination of program effects on mediating variables *Health Education and Behavior, 24(2)*, 165-176.

Hawkins, J.D., Catalano, R., & Miller, J.

1992 Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: implications for substance use prevention. *Psychological Bulletin, 112*, 64-105.

Kandel, D.B., Yamaguchi, K., & Chen, K.

1992 Stages of progression in drug involvement from adolescence to adulthood: Further evidence for the gateway theory. *Journal of Studies on Alcohol, 53*, 447-457.

MacKinnon, D.

1994 Analysis of mediating variables in prevention and intervention research. *NIDA Research Monograph, Number 139*, 127-154. Rockville, MD: National Institutes of Health.

MacKinnon, D.P., Johnson, C.A., Pentz, M.A., Hansen, W.B., Flay, B.F., & Wang, E.Y.I.

1991 Mediating mechanisms in a school-based drug prevention program: First year effects of the Midwestern Prevention Project. *Health Psychology, 10(3)*, 164-172.

Marlatt, G.A.

1996 Taxonomy of high- risk situations for alcohol relapse: evolution and development of a cognitive- behavioral model. *Addiction, 91(12)*, 37-50.

McBride, C.M., Curry, S.J., Stephens, R.S., Wells, E.A., Roffman, R.A., & Hawkins, J.D.

1994 Intrinsic and extrinsic motivation for change in cigarette smokers, marijuana smokers, and cocaine users. *Psychology of Addictive Behavior, 8(4)*, 243-250.

McNeal, R.B., & Hansen, W.B.

1999 Developmental patterns associated with the onset of drug use: Changes in postulated mediators during adolescence. *Journal of Drug Issues*, 29(2), 381-400.

Moffitt, T.

1993 Adolescence-limited and life-course persistent antisocial behavior: a developmental taxonomy. *Psychological Review*, 100, 674-701.

Moffitt, T.

1997 Adolescence-limited and life-course-persistent offending: a complementary pair of developmental theories. In T. Thornberry (Ed.), *Developmental Theories of Crime and Delinquency* (pp. 11-54). New Brunswick: Transaction Press.

INSERT MRAZEK & HAGGERTY, 1994

Nagin, D., Farrington, D., & Moffitt, T.

1995 Life-course trajectories of different types of offenders. *Criminology*, 33, 111-139.

Nagin, D., & Land, K.

1993 Age, criminal careers, and population heterogeneity: specification and estimation of a non-parametric, mixed Poisson model. *Criminology*, 31, 327-362.

Pallonen, U.E., Leskinen, L., Prochaska, J.O., Willey, C.J., Kaariainen, R., & Salonen, J.T.

1994 A two-year self-help smoking cessation manual intervention among middle-aged Finnish men: An application of the Transtheoretical Model. *Preventive Medicine*, 23, 507-514.

Pentz, M.A., Dwyer, J.H., MacKinnon, D.P., Flay, B.R., Hansen, W.B., Wang, E.Y.I., & Johnson, C.A.

1989 A multi-community trial for primary prevention of adolescent drug abuse: Effects on drug use prevalence. *Journal of the American Medical Association*, 261(22), 3259-3266.

Prochaska, J.O., DiClemente, C.C., & Norcross, J.C.

1992 In search of how people change: Applications to addictive behaviors. *American Psychologist*, 47(9), 1102-1112.

Snow, M.G., Prochaska, J.O., & Rossi, J.S.

1992 Stages of change for smoking cessation among former problem drinkers: A cross-sectional analysis. *Journal of Substance Abuse*, 4, 107-116.

Sussman, S., & Dent, C.W.

1999 One-year prospective prediction of marijuana use cessation among youth at continuation high schools. *Addictive Behaviors*, 24(3),411-417.

SELF-INITIATED CESSATION FROM SUBSTANCES USE

Sussman, S., Dent, C.W., Severson, H., Burton, D., & Flay, B.R.

1998 Self-initiated quitting among adolescent smokers. *Preventive Medicine*, 27(5), A19-28.

