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WHAT COSTS, PROCEDURES, AND PROCESSES ARE CRITICAL TO PREVENTING YOUTH SUBSTANCE ABUSE?

by

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ABSTRACT

This study evaluates the relationships between the costs, procedures, processes, and outcomes of a school-based substance abuse prevention program for high-risk youth from six urban elementary schools. Program procedures, including peer groups for youth and a family involvement component, were assessed in terms of the costs expended to implement these procedures. Contrary to expectations, participation in the program was linked to increased willingness to use and increased use of alcohol, tobacco, and other drugs (ATOD's). Social responsibility was found to be a critical process, with higher levels of social responsibility related to decreased ATOD use and willingness to use. The program group, and specifically the peer group procedure, was inversely related to social responsibility. The iatrogenic effect of the program on social responsibility was, however, temporary as it was not present at followup tests. Recommendations for future programming efforts are discussed.

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INTRODUCTION

The current level of ATOD use among U.S. youth is unacceptably high: 90% of U.S. high school seniors reported drinking alcohol at some time in their lives, 64% said that they smoked cigarettes, and 48% had experimented with illegal drugs (Johnston, O'Malley, & Bachman, 1993). Recent surveys of youth's use and attitudes about illegal drugs indicate that the steady decline in ATOD use among youth has ended (Johnston et al., 1993). Fewer youth (in 8th, 10th, and 12th grade) perceived illegal drugs as harmful in the 1992-93 survey than in the 1991-92 survey (Johnston et al., 1993), while use of some illicit drugs, such as marijuana and hallucinogens, increased in each of the last two years of the study (Johnston et al., 1993). Moreover, youth are experimenting with ATODs at younger ages, with one out of every five sixth graders having at least tried alcohol (Hansen, 1993). A Metropolitan Life Statistical Bulletin (1987) reported on a Metropolitan Life Survey regarding attitudes of fourth- through sixth-grade students about ATOD use. The survey found that less than half of the students viewed alcohol and cigarettes as drugs; the proportion of children who regarded daily use of alcohol as harmful declined markedly by the sixth grade; and more than one-third of the fourth graders experienced "some" to "a lot" of peer pressure to try alcohol. These findings indicate that the use of ATODs among our nation's youth remains a serious public health problem (Hawkins, Catalano, & Miller, 1992).

The total economic cost of substance abuse to the nation is immense. One study conducted at the University of Southern California (USC) estimated the total economic

cost of drug abuse at $76 billion in 1990, an increase of more than $30 billion from $44 billion in 1985 (Parsons & Kamenca, 1992). The USC study predicted that drug abuse costs will reach $150 billion by 1997 if current patterns continue (Parsons & Kamenca, 1992).

Etiology of Alcohol, Tobacco, and Other Drug Use

The etiology of adolescent ATOD abuse has been linked to multiple and diverse risk factors (Hawkins et al., 1992). Family, school, and societal attachment were among the risk factors identified by Hawkins et al. (1992) as the most highly potent predictors for adolescent ATOD abuse. Positive relationships between parents and children and parental involvement in activities with children appear to inhibit youths' ATOD involvement; whereas, lack of closeness and parental involvement increase the likelihood of adolescent ATOD use (Hawkins et al., 1992). Johnston, O'Malley, and Bachman (1986) found that at-risk youth who are less bonded and have little commitment to school also are more likely to use ATODs and to become delinquent. The annual *Monitoring the Future* survey of U.S. high school seniors indicates that the use of hallucinogens, cocaine, heroin, stimulants, sedatives, and non-medically prescribed tranquilizers is significantly higher among students who do not plan to attend college, relative to those that do (Johnston, O'Malley, & Bachman, 1985). Youth who do not share the mainstream norms and values of society have also been shown to be at greater risk for ATOD use (Hawkins et al., 1992). Characteristics of these youth include alienation, low religiosity, and rebelliousness. Thus, these findings indicate that youth who are less bonded to family, school, and society are at increased risk of using ATODs.

The importance of bonding to family, school, and society is a key feature of the social development model. The social development model (Hawkins & Weis, 1985) unites control theory (Hirschi, 1969) with social learning theory (Bandura, 1977) and is closely

akin to Bowlby's concept of attachment (Bowlby, 1969). The social development model hypothesizes that bonding to prosocial family and school will reduce the likelihood of both associations with drug-using peers and drug use (Funkhouser, Goplerud, & Bass, 1992). The social development model specifies three processes that produce bonding to a social unit: (a) opportunities for participation in the social unit, (b) possession of skills needed by individuals in these social units, and (c) a system of rewards or reinforcements offered for prosocial behavior in the family and school units (Hawkins, Catalano, & Miller, 1992). Bonding to a social unit consists of three elements that have been shown to reduce ATOD use: attachment to people in the social unit, namely parents (Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Jessor & Jessor, 1977); commitment to the activities of the social unit, such as schooling (Johnston, Bachman, & O'Malley, 1981); and belief in the expectations, norms, and morals of that social unit (Krohn & Massey, 1980). While bonding can occur to negative role models or institutions (i.e., becoming bonded to an ATOD-using gang), "prosocial bonding" suggests a high degree of attachment to the conventional role models of family and school and a low degree of alienation and rebelliousness (Funkhouser et al., 1992). Thus, the social development model predicts that the processes of family, school, and societal bonding buffer the risk of adolescent ATOD abuse through the mechanisms of attachment, commitment, and beliefs (Hawkins et al., 1992).

While emphasizing the role of social and educational institutions, the social development model focuses relatively little attention on individual differences among adolescents (Petraitis, Flay, & Miller, 1995). Applications of the model highlight interpersonal and academic skills, but few have focused on the interactions of bonding with varying youth demographic characteristics, such as gender, age, and race. The social development model hypothesizes that the influence of families, schools, and peers shifts developmentally, with parents wielding the greatest influence during preschool, teachers

during pre-adolescence, and peers during adolescence (Petraitis et al., 1995). Similar postulates concerning gender and ethnicity have not been clearly defined by the model or its present applications.

Proposed Solutions to the Problem

The notion of bonding as etiology has grounded most recent efforts to prevent drug abuse (Hawkins et al., 1992). As the processes resulting in ATOD use outcomes have yet to be fully understood, there have been numerous other attempts to address the problem that have not followed the bonding framework. The three primary strategies used for controlling ATOD use are: treatment, supply reduction, and prevention. Treating the nation's ATOD problem is costly as it takes place after the individuals become drug users and it appears ineffective in eliminating ATOD use, particularly adolescent ATOD use (Stein & Davis, 1982). Traditional drug treatment programs that focus on physiological dependence may not adequately address the "life problems" of youth who are using and abusing ATODs (Bennett, 1983). Because these programs address the wrong problems, they are often ineffective in treating adolescent ATOD use (Harmon, 1993). Similarly, supply reduction efforts to reduce production, availability, and sale of illicit drugs have proved equally ineffective (Harmon, 1993). The Rand Corporation Report on Strategies for Controlling Adolescent Drug Use (Polich, Ellickson, Reuter, & Kahan, 1984) provides an analysis of why supply reduction interventions are ineffective in reducing adolescent ATOD use.

The Potential for Prevention

As supply reduction and treatment have not effectively curtailed the problem of adolescent ATOD use, an alternative strategy is gaining more attention, that is, the prevention of ATOD use. Potential benefits of prevention programs include their timing (early target age) and focus on "gateway" substances, including alcohol, tobacco, and

marijuana (Harmon, 1993). Because ATOD use can begin at an early age, prevention efforts must take place prior to the youth's exposure to ATODs. Thus, many recent prevention efforts target their programs to elementary school students. In addition to the early target age and focus on gateway substances, an additional rationale for prevention is the high cost involved if youth develop into substance-abusing individuals. While the field of prevention is still maturing, there are indications that the monies spent on prevention may result in cost savings in treatment and other economic and societal costs related to ATOD abuse. Prevention program evaluations rarely publish their effectiveness or benefit rates and compare them with the costs of ATOD use (Kumpfer, 1990). Cost-effectiveness and cost-benefit analyses may help to determine whether a program strategy is worthwhile and to inform program developers regarding ways of enhancing benefits and reducing costs.

A variety of prevention models and strategies have been developed over the past three decades in an effort to curtail the escalating economic and societal costs of our nation's drug problem. In the 1960's and 1970's, most prevention programs were simple interventions targeted at individual youth such as information dissemination, affective education, or alternative activities. Research on outcomes of these approaches demonstrated that they did not reduce, and in some cases, increased experimentation (Gordon & McAlister, 1982). The next generation of programs implemented during the 1980's focused on social and psychological factors such as interpersonal skills, peer resistance skills, and decision-making skills (Kreutter, Gewirtz, Davenny, & Love, 1991). Prevention programs of this generation were generally more effective in reducing adolescent ATOD use (Botvin & Dusenbury, 1987; Schinke & Gilchrist, 1985). With the increasing awareness that ATOD use was attributable to multiple factors, multidimensional programs that used a variety of strategies were implemented during the late 1980's and early 1990's. Today, there is a consensus among researchers that prevention programs

need to focus their interventions not only on the youth, but also on their family, school, and peer environments (CSR, 1992). Procedures that focus on these domains may reduce the risk of adolescent ATOD use by enhancing prosocial bonding processes (Hawkins et al., 1992).

While these programs overall have been more effective than prior approaches, results of current prevention program evaluations have often been contradictory and modest in findings. The Drug Abuse Resistance Education (D.A.R.E.) is an example of a program that has been replicated nationwide, despite inconsistent evaluations (Dukes, Ullman, & Stein, 1995). In 1991, Ringwalt, Ennett, and Holt reported that a group of D.A.R.E. participants had increased resistance to peer pressure and less positive attitudes toward ATOD's, but they did not find any differences in self-reported ATOD use. In a follow-up study of another D.A.R.E. program, Clayton, Cattarello, and Walden (1991) found no differences between program participants and controls except that the D.A.R.E. group reported more use of marijuana than did controls. Other studies of D.A.R.E. have found positive results as well as indications that the programs are inefficacious or even iatrogenic.

Given the potential that prevention programs may be ineffective or even detrimental, these analysis points to the need for additional research to investigate which processes are related to ATOD use prevention, which procedures have the greatest effect on these processes, and what costs are expended to achieve this impact. In an attempt to empirically test the outcomes of two program procedures, student small group meetings and a family involvement component, this study looks at the costs and effects of Project C.A.R.E. (Children At-Risk Education) which was implemented in Lancaster, Pennsylvania. This ATOD use prevention program offered an integrated child and parent(s)/guardian(s) [hereafter, parent(s)] intervention strategy for primary school age youth.

Research Questions

This study explores the relationships between the various program components (i.e., costs, procedures, and processes) that together determine program effectiveness. In order to examine these relationships, the following four main research questions were addressed:

1. Is there a significant relationship between the processes of bonding and the prevention of ATOD use?
2. Do program procedures (small student group meetings and a family involvement component) facilitate the occurrence of these processes?
3. What was the range of costs used to implement these prevention procedures?
4. How do subject demographics and exogenous variables moderate the impact of program procedures and bonding on ATOD use?

Together, these research questions address the general question of how to minimize costs necessary to achieve particular outcomes and how to maximize possible program outcomes given resource constraints.

Description of the Intervention

Project C.A.R.E. was initiated in response to the School District of Lancaster's concern over increases in several ATOD risk factors including, the number of elementary school children exposed to or experimenting with ATODs (CSR, 1992). The program was a 12-month, school-based, prevention education training program for at-risk minority and other fourth grade students that was offered to 3 cohorts of youth over a period of three years. The main goal of the program was to prevent ATOD use by increasing resiliency and protective factors while decreasing risk factors in high risk youth and their families. Program objectives included increasing positive feelings towards school and improving the family environment of participating youth. Two primary program strategies

were used to build student and parent resiliency and reduce or balance the impact of risk factors: student small group meetings and a family involvement component.

Student groups of four to eight children met weekly during the academic year for 35 to 40 minutes with the program staff member assigned to their school. During the summer, the groups met twice monthly and were community-based. These educational groups used a life skills training curriculum that included a book, worksheets, activities, and interactive games. Specific sessions focused on topics related to the development of prevention skills, such as self-esteem, ATOD education, dangers of unhealthy behaviors, and decision making and coping skills. Motivational or arousal techniques were incorporated in the curriculum through medium such as films and presentations. Individual meetings were held for a minimum of 30 minutes per month with each child in the program to reinforce concepts presented in the group and to discuss issues of concern. Other student group activities included bi-monthly field trips to special places or events. Field trips, which ranged from a few hours during the school year to all-day trips during the summer, were conducted for all of the program children as a group. Program youth also participated in a 5-day overnight camping trip in the summer that was designed to bring closure to the year-long program.

The family involvement component included home visits scheduled every other week with the parents of the program children to promote family communication and to encourage family involvement. The program also provided a bi-monthly parent education and support group for parents of participating children at all six schools. This intervention initially consisted of parent group meetings held separately at each school. To increase participation, parent and family activities were later conducted at a local church for the families of all program youth. Parents and children participated together in a social family activity followed by separate activities for children and parents. While the children engaged in recreational activities, parents received training from program staff in

appropriate disciplinary tactics, communication skills, stress management and understanding of ATOD risk factors. Parents were also invited to participate in student field trips and to join the students for one day at camp.

Project C.A.R.E.'s focus on enriching youth's family environment and promoting their school commitment and academic success is best suited to analysis through the social development model. Additionally, the program's prevention approach is consistent with the bonding processes outlined in the social development model. That is, the program provides youth with (a) opportunities for involvement in prosocial activities with parents and school, (b) skills needed to refuse ATOD use, engage in alternative activities, and succeed in school, and (c) positive reinforcement through academic enrichment and family cohesion. Thus, the program provides a test case for evaluating the social development theory as an adolescent ATOD abuse prevention framework. Whether the mechanisms of bonding can provide this program with a cost-effective solution to the adolescent ATOD use problem is a question of additional interest. Given the severity of the ATOD use problem, the lack of knowledge about prevention, and the limited resources available, there is a critical need for researchers, program specialists, and policymakers to know if a prevention strategy is effective, for whom it is effective, and at what cost.

CHAPTER 2

METHOD

Research Design

Outcome data were collected by an external evaluator from a school-based substance abuse prevention program designed to prevent ATOD use among high-risk elementary school students and their families. A pilot test of the project was conducted from March 1990 to August 1990 (future years ran from September to August) to develop and revise student and parent instruments, data collection methods, and program procedures. Pilot data were not included in this analysis as the pilot results were based on only three months of the program (posttest surveys were administered in May 1990).

Project C.A.R.E. was in place for three school years (1990-1993), working with three cohorts of fourth graders and their families. The program employed an experimental, longitudinal design involving fourth grade students who were assessed as at-risk. As shown in Table 1, the outcome evaluation used repeated measures in a pretest, posttest, and nine-month to two year follow-up survey form to examine program and control groups on variables of interest.

Table 1

Evaluation Design

Note. Cohort 1 = 1990-1991; Cohort 2 = 1991-1992; Cohort 3 = 1992-1993. — indicates not applicable. Pilot year data is not included in this analysis. Unless otherwise noted, cohorts include measures for students and program parents.

Measurement Assignment, Occasions, and Interventions by Group

Cohort	Pretest	Program	Time	Posttest	Time	Follow-up 1	Time	Follow-up 2
				Program Group				
1	Fall 90	9/90 - 7/91	1 yr.	Fall 91	1 yr.	Fall 92[1]	9 mo.	Spring 93
2	Fall 91	9/91 - 7/92	1 yr.	Fall 92	9 mo.	Spring 93[1]		
3	Fall 92	9/92 - 5/93	9 mo.	Spring 93				
				Control Group				
1	Fall 90	—	1 yr.	Fall 91	1 yr.	Fall 92	9 mo.	Spring 93
2	Fall 91	—	1 yr.	Fall 92	9 mo.	Spring 93	—	—
3	Fall 92	—	9 mo.	Spring 93	—	—	—	—
				Baseline Group				
1	—	—	—	Fall 91	—	—	—	Spring 93
2	—	—	—	—	—	Spring 93	—	—
3				Spring 93				

[1] Students only

A lower risk baseline sample was also included in the design, at posttest and follow-up tests, to control for major threats to internal validity, specifically, threats of maturation and testing (Campbell & Stanley, 1963). The baseline group provided an additional comparison group at posttest and follow-up tests. The program aimed to achieve a statistically significant difference between program and control students' willingness to use and actual use of ATODs, with program students predicted to exhibit less favorable attitudes toward use and less actual use than control students. The desired outcome of the program was to reduce willingness to use and actual use among program students such that there would be no statistically significant differences between program and baseline groups at posttest and follow-up tests.

Setting

The program was implemented by the School District of Lancaster in six of the district's thirteen elementary schools. Most of the program activities for youth were conducted separately in each of the schools, with the exception of the camping and field trips, which involved all of the six schools together. Activities for parents of all program youth were conducted at a community church and at the participants' homes. The six target schools were selected for the program based on the following criteria: (a) serves primarily at-risk populations; (b) serves mixed ethnic, cultural, and socioeconomic groups; (c) has similarity to other schools in terms of size, programs, and costs; and (d) has a principal and staff willing to participate in the study. At-risk populations refer to students who meet the at-risk criteria as defined below.

Participants

The program worked with students and their parents or guardians for a 12-month period, at which time a new group of children were selected to participate in the program.

From six elementary schools, a total of 64 program youth (16 from each of the 2 largest schools and 8 from each of the other 4 schools) and an equal number of control youth were targeted each year for inclusion in the program. Students were randomly selected for the program or control group based upon an at-risk assessment completed by classroom teachers for each child. For children to be identified as at-risk of becoming a drug abuser, they had to meet a minimum of two of the following criteria: (a) is economically disadvantaged; (b) exhibits anti-social behavior, or has committed a violent or delinquent act; (c) had parents who use drugs and have positive attitudes toward drug use; (d) has a family with a history of alcoholism; (e) comes from a family that evidences family, management, and expectation problems regarding the child's behavior; (f) has little commitment to school; (g) evidences alienation, rebelliousness, and/or lack of social bonding; (h) has friends who use alcohol and/or drugs; (i) has experienced mental health problems; (j) has attempted suicide, or (k) is a victim of physical, sexual, or psychological abuse.

Student risk assessments used for program assignment were sent to the evaluator where they were scored and rank ordered from highest to lowest risk score (27 to 0 is the possible range). The evaluator then assigned alternative numbers of students with the highest risk ratings to the program group (1, 3, 5, etc.) and to the control group (2, 4, 6, etc.). A letter was sent to the parents of selected program and control students to introduce them to the program. The introductory letter was followed by a telephone call and then a meeting in the home to enlist consent for their children's participation as well as to promote parental participation. Control parents were informed that they and their child were selected to complete surveys designed to improve programs in their school district. All control families were informed that for each survey they complete, they receive a coupon for a free pizza. Thus, while students were randomly selected for assignment to groups, once assigned, their participation was voluntary. Those students who refused

placement in the program were dropped from the study. Consent in English or Spanish was obtained in all cases from the children's parents or guardians. Program records did not provide any information regarding the debriefing of subjects.

Group assignment procedures were changed under special circumstances. When half of the selected program group families refused to participate, control families (from whom consent had not yet been obtained) were randomly selected for the program group. Families who declined to be assigned to the control group were not eligible for participation in the program group. On the occasion that two children from the same family were selected, both were placed in the same group. In the event that a child's family had previously participated in the program, the child was automatically assigned to the program. Special education students were excluded from the sampling pool (including the baseline group) as the program curriculum is not appropriate for educable mentally retarded and severely emotionally disturbed children. Information was not available as to the percentage of parents who refused consent for their children and the percentage of children refused their own participation.

Once enrolled in the program, participation was measured by level of attendance in program activities. For example, for the 1990-1991 cohort, families who attended 62 or fewer program activities are included in the low family involvement group, and families who attended more than 62 activities are included in the high family involvement group (based on median attendance). The overall dropout rate ranged from 4% among participant students and 11% among control students. In both groups, most students dropped out because their families moved out of the area, usually during the summer months, before the posttest was administered (CSR, 1992). A statistical test of the dropout rate is provided in the Results section.

From the six elementary schools, a total of 342 fourth-grade students and their parents or guardians participated in the study; 169 students received the treatment and 173

served as control students. The study also included a baseline student sample that consisted of 269 fifth graders and 288 sixth graders in Cohort 1, 200 fifth graders in Cohort 2, and 281 fourth graders in Cohort 3, who attended the same target schools, but were unassessed for risk.

The students included in the analysis were 8 to 11 years of age; the mean age for both program and control groups was 10. Fifty-five percent were male and 45% female, with equal proportions of males and females in both groups. Of the baseline student sample, 46% were male and 54% were female. The racial breakdown of all students was 27% Black, 39% Hispanic, 33% Caucasian, and 1% Other. The program group had 36% African American youth, 37% Hispanic youth, and 27% Caucasian youth; whereas the control group had 20% African American youth, 41% Hispanic youth, and 39% Caucasian youth. Risk ratings were equivalent across program and control group, with a mean risk rating of 7.7 (scale of 0 - 20) for those selected to participate in the evaluation.

The program was implemented in Lancaster City, which at the time of program initiation, contained 15.1% of the population of Lancaster County. The grant application (1989) noted that the city contained a disproportionate number of several population groups, including 27% of the county's population below the poverty level, 73% of the African-American population, and 72% of the Hispanic population. In the city, 37% of the households with children under 18 were single parent or non-family arrangements. The school district had experienced steadily increasing dropout rates, from approximately 5% in 1975 - 1976 to 10% in 1987 - 1988. Information was not available as to the socioeconomic status of the program and control group participants.

Variables

To empirically examine the potentially complex cost and outcome components of this study, a Costs → Procedures → Processes → Outcomes (CPPO) model (Yates, 1995) was employed. As shown in Figure 1, the CPPO model conceptualizes human

services as systems that consume costs such as personnel and supplies in order to implement components of a service program (Yates, 1994).

Figure 1

Hypothesized relationship between participant attributes and prevention program costs, procedures, processes, and outcomes

	PREVENTION PROGRAM			
ATTRIBUTES	**COSTS**	**PROCEDURES**	**PROCESSES**	**OUTCOMES**
Demographics	Major Resources:	Control Group	Family Bonding:	Willingness To Use & Use Of:
Gender	Personnel	Program Group:	Communication With Mother	Cigarettes
Race	Travel	Student Small Group Meetings	Communication With Father	Chewing Tobacco
Age	Supplies	Individual Student Meetings	Parent/Child Communication	Beer
Total Risk Score	Contractual	Field Trips	School Bonding:	Liquor
	Client Time	Camping Trips	Feelings About School Climate	Wine or Wine Coolers
	Other	Home Visits	Societal Bonding	Marijuana
		Parent Group Meetings	Social Responsibility	Cocaine or Crack
				Scrotin (Bogus Drug)

The CPPO model promotes analysis of the relationships between the different components of a program (i.e., the costs, procedures, processes, and outcomes). Hence, the CPPO model was applied to Project C.A.R.E. to examine the relationships between costs, program participation, family, school, and societal bonding, and ATOD use outcomes. While the use of traditional input-outcome or cost-benefit/cost-effectiveness analysis models (Yates, 1985; Kazdin, 1992; Levin, 1987) was considered, such models do not allow for the level of detailed analysis necessary for the conceptualization of complex, social programs. Conversely, the main advantage of the CPPO model is its ability to account for all of the various components of the program, from the costs consumed to the outcomes achieved, with attention to all of the intervening variables.

In applying this model to Project C.A.R.E., costs refer to the time, staff, equipment, and space necessary to enact the procedures or interventions that the program provides. The program procedures interact with attributes related to youth demographic characteristics such as gender, age, race, and risk level. Bonding processes are expected to covary with age. As a result of these interactions, psychosocial processes are predicted to occur, namely an increase in bonding to family, school, and society. Bonding has been identified as a process because it is a change in behaviors, cognitions, and effects that occur within the individual and are not directly observable (Yates, in press). For the purposes of this study, bonding is not classified as an outcome because the targeted outcome of the program is substance abuse prevention. Thus, bonding is an intermediate step or psychosocial process that is predicted to determine the ultimate outcome of the substance abuse prevention programs, that is, a reduction or prevention of intent to use ATODs and actual ATOD use among high-risk youth.

Instrumentation

Measures used for participant selection, outcomes, processes, procedures, and costs are discussed below.

Participant selection

A high risk indicator form completed by third grade teachers was used to select students for the project. The program-developed teacher survey was used to identify youth at highest risk for using ATODs. The form asked teachers to rate each student's attendance, academic grades, involvement in special programs, frequency and severity of behavior problems, number of suspensions, suspected family and/or student drug and alcohol involvement, parental involvement in child's education and frequency with which child comes to school physically unkempt (Hostetler, 1993). No information was available as to the reliability and validity of this measure.

Outcomes

Most of the scales in the Project C.A.R.E. Attitude, Opinion, and Behavior Surveys for students and parents were adapted from existing instruments. Adaptation included shortening the scales to assess all of the outcomes of interest as well as simplifying or rewording items because of the sample's reading difficulties. New scales were only developed in the event that the evaluator was unaware of any appropriate existing measures.

The Feelings About School, intent to use substances, and substance use scales were taken from a widely used measure with established reliability and validity, the Primary Prevention Awareness, Attitudes, and Usage Scales (Swisher, 1990). The Social Responsibility scale was adapted from the societal responsibility subscale in the Educational Quality Assessment used in the state of Pennsylvania. The Parent-Child Communication scale was developed for Project C.A.R.E. to meet their specific needs. Parent surveys were developed in both English and Spanish. A pilot test of the student and parent surveys and data collection procedures was conducted to ensure the reliability and validity of the surveys for the target population. The concurrent validity of the

surveys was established by correlating student and parent reports of student negative behaviors. Mothers' reports of the children's negative behavior were significantly correlated with students' at both pretest ($r = .41$, $p < .01$) and at posttest ($r = .31$, $p < .01$) (Hostetler, 1992). To further assess concurrent validity, students' total risk scores at pretest, which were based on teacher reports of students' behavior, were correlated with students' self-reports of their behavior at pretest. The Rightwriter program in Word Perfect 5.1 rated the readability of the student survey at the fourth-grade level and the parent survey at the seventh-grade level.

Four student scales related to ATOD use and intent to use were considered. The Willingness to Try Gateway Substances scale indicates willingness to try the following gateway substances: cigarettes, chewing tobacco, beer, liquor, wine or wine coolers, and marijuana. Scores can range from a minimum of 6 to a maximum of 30, with higher scores indicating more willingness to try gateway substances. The scale has a Cronbach Alpha coefficient (alpha) of .81 (Hostetler, 1993 - c). The Willingness to Try All Substances Scale indicates willingness to try all of the previously mentioned gateway substances in addition to serotin (bogus drug), crack/cocaine, and ice. Scores can range from a minimum of 9 to a maximum of 45, with an alpha reliability of .69 (Hostetler, 1993 - c). The Use of Gateway Substances is a 6-item sale that indicates how often a student reports use of cigarettes, chewing tobacco, beer, liquor, wine coolers, and marijuana. Scores can range from 6 to 30, with higher scores indicating more use. This scale has an alpha reliability of .72 (Hostetler, 1993 - c). These items were also examined on an individual basis. The Use of All Substances scale indicate use of all cigarettes, chewing tobacco, alcohol, wine coolers, marijuana, and crack/cocaine. Because this scale has a low alpha reliability of .16 (Hostetler, 1993 - c), all items were analyzed on an individual basis and not as scale scores.

Processes

The student and parent surveys also examined degree of bonding to school, family, and society. Three scales related to family bonding were assessed. The Communication with Father and Communication with Mother scales are student measures that indicate how often the youth feel they can communicate positively with their father or mother. Scores can range from a minimum of 6 to a maximum of 36, with higher scores indicating more communication with the parent. Both of these scales have an alpha reliability of .87 (Hostetler, 1993 - c). The Parent/Child Communication scale is a parent measure that indicates the degree of parent/child communication. Scores can range from a minimum of 11 to a maximum of 44, with higher scores indicating more family communication. The scale has an alpha reliability of .74 (Hostetler, 1993 - c). A composite measure was also created by combining the Communication with Mother and Communication with Father scales. This composite score was used to derive a single estimate for child's report of bonding with their family. The parent reports of communication with their children were maintained as a separate measure due to low collinearity with the child reports.

One student scale addressed the relationship between the child and the school. The Feelings about School Climate scale includes the following items: feelings about school, teachers, subjects, and classmates. Scores can range from a minimum of 4 to a maximum of 16, with higher scores indicating more positive feelings about school. The scale has an alpha reliability of .59 (Hostetler, 1993 - c).

The Social Responsibility scale is an 8-item scale that indicates a sense of social responsibility. Items addressed ethical dilemmas, such as, what to do if you found a wallet with money in it and would you take candy from a store without paying. Scores can range from 8 to 24, with a high score indicating more social responsibility. The scale has an alpha reliability of .82 (Hostetler, 1993 - c).

Procedures

Program staff completed Student Information Forms that provided program participant information, including program attendance for youth and parents. Intervention procedures were evaluated by degree of participation in the program as a whole as well as in each component procedure. Attendance at program procedures was used to determine degree of procedure implementation.

Costs

Program budget statements indicate general cost data, including expenditures for personnel salaries, fringe benefits, travel, supplies, contractual, and miscellaneous expenses. To determine the costs expended, estimates were made of time allocated to the project by program staff. The study estimated the allocation of major resources for each program procedure, including the mean cost per client and the total cost of each program procedure.

Attributes

Student Information Forms completed by program staff also provided information on participant attributes, including gender, race, age and total risk scores.

Sampling Procedures

Following random assignment to group, program and control group families were contacted to elicit their participation in the program and/or data collection. The timing of the data collection is presented in Table 1. Whereas posttest surveys were initially administered in one year intervals, the survey administration procedure was modified to nine-month intervals due to time constraints imposed by the program's lack of a fifth year of funding. Whereas the program assumed they were funded for a five-year grant, they discovered in the latter part of their second year that they were only funded for four years.

Thus, accommodations were made to complete program activities according to a modified timeline.

Parents of program youth completed the parent survey at the same time as the program group; however, parents did not complete the first follow-up test given to cohort 1 and 2 students. The parents were not surveyed at the first follow-up because of budget limitations and it was believed that parental reports of their own and their children's behaviors would not significantly change over a nine month period. Baseline youth were surveyed at the last test occasion, with the exception of the first cohort that had two baseline data collections. Baseline youth completed the survey at the time of the posttest and second follow-up for the 1990-1991 cohort, at the time of the first follow-up for the 1991-1992 cohort, and at the time of the posttest for the 1992-1993 cohort.

Surveys were assigned a code in order to link pretest and posttest data. Teachers emphasized confidentiality to students, to ensure that self-reported drug using behaviors would have a high degree of reliability and validity. The pretest, posttest, and follow-up tests were orally administered to the students using a script prepared by the evaluator. The parent surveys were administered individually in the home. Program staff read the survey (in English or Spanish) for parents who had difficulty reading the form. All outcome data collection activities were directed by the program's external evaluator.

CHAPTER 3

RESULTS

Quantitative data analyses were conducted in the following steps. First, the data were arranged to make them suitable for analysis. Next, a lie analysis was conducted based on the inclusion of a bogus drug "serotin" in the self-report survey. Initial differences and differential effects of attrition between groups were examined to check for non-equivalence of groups, a condition that would threaten internal and external validity. Descriptive analyses were then conducted to determine overall score trends across program and control groups for all variables examined. These analyses were conducted for both pretests and posttests. Differences between groups were examined next.

When two groups were compared, t-tests were used; for more than two groups, 1-way ANOVA's were used. Repeated measures ANOVA's were also used to test for change over time. Categorical variables were assessed using chi-square analyses. The final step involved using multiple regressions to examine the strength of the relationships between each part of the CPPO model. A series of multiple regressions was conducted, proceeding from outcomes to costs in the C P P O sequence. First, we examined the contribution of the hypothesized psychosocial processes (family, school, and societal bonding) to the ATOD outcome measures. The next analyses assessed relationships between program procedures and significant processes. Procedures were conceptualized as discrete variables in one set of analyses : (i.e., program versus control groups), and as continuous variables in other analyses (i.e., participation in procedure). Relationships between program costs and procedures then were assessed to determine the amount of

resources necessary to enact the promising procedures. Direct links were also investigated between procedures and outcomes, and between costs and outcomes. The following evaluation data were analyzed using SPSS 6.1 for Windows (Nie, 1993).

Data Preparation

Data provided by parents were modified because in some cases there were multiple data for each child. That is, more than one parent or other guardian completed either pretest or posttest surveys, resulting in multiple data records for a single child in the data set. Retaining this data would result in these students being over-represented in the analyses. We decided to use data from the mothers only based on the small number of fathers and other respondents (10% of the original data set) that may indicate a lack of generalizability in their data.

The data set was also modified to include only students and mothers who completed both pretest and posttest surveys (N = 187; n = 117 program group, n = 70 control group). The larger number of program group participants in this data set reflects the higher levels of attrition in the control group. The completer data set was used for all subsequent analyses because on initial tests it yielded equivalent results to the non-completer data set (See Attrition Analysis). While the sample size is reduced when requiring pre and post test data, versus just pretest data, , the completer data is needed to make comparisons of participants from pretest to posttest. In general, it is common practice in the ATOD outcome literature to include only data matched for both pretest and posttest and/or data available for all variables of interest (Hansen & Graham, 1991; Donaldson, Graham, Piccinin, & Hansen, 1995). Later, in the Results we discuss other data sets or modifications to the data set used for specific analyses.

There was no need to transform the data because both pretest and posttest data generally adhered to a normal distribution.

Lie Analysis

No students reported willingness to use or use of the bogus drug "serotin." This finding demonstrates basic ATOD knowledge among students sampled.

Attrition Analysis

Attrition was examined separately for child and parent respondents, who totaled 342.

Attrition was low overall, but was significantly higher in the control group than the program group, with 11% attrition among control students and 3% attrition among participant students, $\chi^2(1, \underline{N} = 342) = 6.97$, $\underline{p} < .01$ (Table 2).

Table 2: Difference in Attrition Rate By Group

	Attrited	Retained
Program (n)	6 (3%)	163 (97%)
Control (n)	19 (11%)	154 (89%)
Total (n)	25 (7%)	317 (93%)

Student attrition in both groups seemed largely because their families relocated from the area, usually during the summer before the posttest was given (CSR Incorporated, 1992). The overall attrition rate of the study was 7% from pretest to posttest (following program completion for each cohort). While standard attrition percentages were not available in the ATOD literature, comparisons to similar studies suggest that 7% is a fairly low

attrition rate (Hansen & Graham, 1991; Snow, Tebes, Arthur, & Tapasak, 1992). Attrition percentages appeared to increase over the three years of the program from 5% for Cohort 1 to 7% for Cohort 2 to 10% for Cohort 3; however, this difference was not statistically significant, $\chi^2(2, \underline{N} = 342) = 2.36$, $\underline{p} = .31$. The girls had a significantly higher attrition rate than the boys, with 11% attrition for girls and only 5% attrition for boys, $\chi^2(1, \underline{N} = 342) = 4.31$, $\underline{p} < .05$ (Table 3).

Table 3: Difference in Attrition Rate By Gender

	Attrited	Retained
Boys (n)	9 (5%)	182 (95%)
Girls (n)	16 (11%)	135 (89%)
Total (n)	25 (7%)	317 (93%)

Race was not a significant predictor of program completion status, $\chi^2(2, \underline{n} = 329) = 4.53$, $\underline{p} = .10$. Whether a student was assessed as "low risk" or "high risk" was also not significantly related to attrition, $\underline{t}(328) = -1.05$, $\underline{p} = .29$.

There was a much higher rate of attrition for parents, with 21% of the program group parents and 22% of the control group parents not completing both the pretest and posttest surveys. There was no difference in parent completion of pretest and posttest surveys by parents in the program and control groups, $\chi^2(1, \underline{n} = 294) = .11$, $\underline{p} = .74$. The relationship of the parent to the child (i.e., mother, father, other) did not appear to affect

attrition. Approximately 78% of mothers and 79% of fathers or other guardians completed both pretest and posttest, $\chi^2(1, n = 285) = .02$, $p = .88$.

Completers and non-completers did not significantly differ in their self-reported Willingness To Use and Use of ATODs at pretest, $ts(266 \text{ to } 269) < .72$, $ps > .05$. The range in degrees of freedom reported for the t-values reflects the number of respondents with usable data for the variables assessed. There also were no significant pretest differences between the two groups on any of the bonding variables, $ts(227 \text{ to } 271) < 1.76$, $ps > .05$. The equivalence of program completers and non-completers on all pretest process and outcome variables supports the use of the completer data set for subsequent analyses.

Pretest equivalency

Pretest equivalency was examined using the completer data set ($N = 187$) to allow for posttest comparisons with pretest data.

Program and control groups differed significantly on a number of important variables, suggesting that group assignment may not have been as random as planned by the researchers. There were significant differences at pretest in terms of Social Responsibility, Use of Cigarettes, and Risk Level, with the program group being less socially responsible, using more cigarettes, and having a higher risk status than the control group. Significant differences in the racial composition of groups as well as gender differences in ATOD use behaviors and Social Responsibility were also evident at pretest. Although significant differences were found at pretest on a number of variables, no significant differences were found between groups in terms of gender, age, and all other process and outcome variables included in the analysis, $ps > .05$.

At pretest, the control group reported higher levels of Social Responsibility, $t(178) = 2.00$, and less use of cigarettes, $\chi^2(1, n = 184) = 3.91$, than the program group, $ps < .05$. Another significant difference at pretest was that teachers rated program group

students higher in total risk at pretest than their control counterparts, $t(115) = -2.83$, $p < .005$. Although not desirable from the perspective of basic research design, finding significantly elevated risk for the program group can be viewed as strengthening any outcomes generated by the program as it provides for a more stringent test of the program's effectiveness. The students' self-reports revealed no other initial differences between program and control groups on scale measures of Willingness To Use or Use Of ATODs, $t(182\text{-}185) < 1.95$, $ps > .05$, although Use of Gateway ATODs approached significance, $p = .052$, with higher levels of use in the program group at pretest.

Races also were distributed differently between the program and control groups, $\chi^2(2, n = 186) = 8.32$, $p < .05$. The program group had 28% African American students, 44% Hispanic students and 27% Caucasian students, whereas the control group had 12% African American students, 46% Hispanic students, and 42% Caucasian students. One-sample chi-square tests indicated that there were significantly more African-American youth, $\chi^2(n = 186) = 15.24$, $p < .001$, in the program than the control group. There were no significant differences in the distribution of Hispanic and Caucasian students, $p > .10$.

Racial differences between groups were examined and the only significant difference found was in the pretest measure of Parent Report: Communication with Child. A Tukey least significant difference or LSD test indicated that Caucasian parents reported significantly poorer communication with their children than did African-American or Hispanic parents, $F(2, 172) = 6.08$, $p < .005$. There were no significant racial differences between Caucasian, African-American, and Hispanic youth in pretest measures of other bonding variables or ATOD scale scores, $ps > .05$.

To examine individual ATOD use items, the data were regrouped into larger units for statistical analyses. For example, the survey items pertaining to ATOD use and willingness to use originally had 5 response options ranging from "never" to "daily" and "never" to "anytime," respectively. Because most of the youth's responses were in the

"never" category, this category was retained and the other 4 categories were grouped into one. Thus, Willingness To Use ATODs was grouped into "willing" and "not willing" and ATOD use was grouped into "never" and "before" for χ^2 analyses. There were no significant racial differences for individual measures of use or willingness to use beer, chewing tobacco, cigarettes, wine or wine coolers, liquor, and marijuana, $\chi^2(2, \underline{n} > 180) < 3.72$, $\underline{ps} > .15$. The lack of significant racial differences in overall measures of Willingness To Use and Use Of ATODs at pretest reduces the threat of bias from the uneven racial distribution in program and control groups.

Several significant gender differences were found in scale measures of Willingness To Use ATODs and Use Of ATODs at pretest. Boys were more willing to use gateway ATODs, $\underline{t}(185) = 2.36$, $\underline{p} < .05$, and all ATODs, $\underline{t}(184) = 2.22$, $\underline{p} < .05$, than were girls. Boys also engaged in more Use of Gateway ATODs at pretest than girls, $\underline{ps} < .05$. These scale differences were based on gender differences in use and willingness to use two traditional gateway ATODs: beer and cigarettes. Boys were more than twice as willing as girls to use beer at pretest, $\chi^2(1, \underline{n} = 187) = 4.43$, $\underline{p} < .05$. While 22% of boys said they were willing to use beer, only 10% of girls expressed a willingness to use beer. Also, boys were more than four times as likely to report actually smoking cigarettes, $\chi^2(1, \underline{n} = 184) = 5.65$, $\underline{p} < .05$. While 12% of boys reported having smoked before, only 3% of girls said they had smoked. Boys also had significantly lower scores on the measure of Social Responsibility than girls, with higher scores indicating greater social responsibility, $\underline{t}(176) = -1.51$, $\underline{p} < .001$. There were no significant gender differences at pretest in total risk rating, $\underline{t}(115) = .24$, or on any of the process variables, $\underline{ts}(154\text{-}186) < 1.60$, $\underline{ps} > .05$.

Descriptive Analyses

The following analyses describe overall patterns in CPPO variables among program and control groups. Group differences will be assessed later in the analysis of the

relationships between the various CPPO components (i.e., costs, procedures, processes, and outcomes).

ATOD Outcomes

Overall, both program and control youth reported low levels of ATOD use at pretest. Higher levels of willingness to use, than actual use, were reported by both groups, particularly for the gateway ATODs. The largest increases in ATOD use from pretest to posttest were also reported for the gateway ATODs.

Willingness To Use ATODs was significantly higher than actual Use Of ATODs at pretest for both program and control groups, $t(179) = -5.49$, $p < .0001$. Willingness to use was the lowest for cocaine (4%), marijuana (4%), and chewing tobacco (5%); much higher levels of willingness were reported for liquor (10%), cigarettes (14%), wine or wine coolers (20%), and beer (20%).

At pretest, all study participants reported minimal or no use of chewing tobacco, liquor, marijuana, and crack/cocaine. Two percent of youth sampled reported some prior use of chewing tobacco and reported ever having used liquor. There was no history of marijuana or crack/cocaine use at pretest. The percentage of youth who had used was higher for the gateway ATODs, including 6% for cigarettes, 10% for wine or wine coolers, and 17% for beer.

The largest increases in willingness to use ATODs from pretest to posttest were reported for cigarettes (+8%), wine or wine coolers (+9%), and beer (+10%). Twenty-two percent of all youth expressed some willingness to use cigarettes at posttest, 29% were willing to use wine or wine coolers, and 30% were willing to use beer. Smaller increases were reported for chewing tobacco (+ < 1%) and liquor (+5%). Five percent of youth were willing to use chewing tobacco and 15% were willing to use liquor at posttest. Small decreases from pretest to posttest were reported for cocaine (-1%) and marijuana (-1%), with 3% willing to use cocaine and 3% willing to use marijuana at posttest.

The greatest increases in ATOD use from pretest to posttest among program and control students were reported for beer (+5%), wine or wine coolers (+7%), and cigarettes (+8%). At posttest, 22% of youth reported using beer at least once in their lives, 17% had used wine or wine coolers, and 14% had used cigarettes. Smaller increases in use were evident for liquor (+4%), chewing tobacco (+1%), and marijuana (+ <1%). Six percent of all youth had used liquor at posttest, 3% had used chewing tobacco, and less than 1% had used marijuana. Use of cocaine remained 0% at posttest.

Bonding Variables

From the original model of 10 processes, five processes (Communication With Mother, Communication With Father, Parent-Child Communication, Feelings About School Climate, and Social Responsibility) were retained for examination while six processes that assessed various dimensions of school bonding were eliminated from consideration prior to data analysis (Disciplined by School, Self-Reported Grades, Official School Grades, Achievement Test Scores, School Attendance, and Number of Suspensions).

As a validated scale measure of school bonding, the Feelings about School Climate Scale, was already included in the model it was decided that additional variables that measured the same process would serve to obscure the impact of this overall measure. Further, while there is a direct relationship between a youth's feelings about school and their feelings of bonding with the school, the relationship between the other measures and school bonding is more indirect and could be unduly influenced by extraneous factors. For example, School Attendance may not only measure bonding to school but other factors not clearly related to school bonding, such as family instability.

A measure of societal bonding, the Social Responsibility Scale, was added to the analysis to capture the social bonding components of the social development model. The

preliminary analysis had captured only the family and school components of the model, hence including the social bonding dimension allowed for a more complete analysis of the program within the social development model framework.Program group students reported Communication with Mother and Communication with Father at means of 26.5 and 23.9, respectively, with scale scores ranging from 6 to 36. Control group students reported mean Communication with Mother of 26.1 and mean Communication with Father of 23.6. Parents rated their Communication with Child at means of 34.4 in the control group and 33.3 in the program group, with scale scores ranging from 11 to 44. The concordance between child and mother's communications reports was lower in the program group ($\underline{r}$ = .10) than the control group ($\underline{r}$ = .23) at pretest. However, while the program group increased in correspondence between child and parent reports from pretest to posttest (posttest $\underline{r}$ = .28), the control group decreased in correspondence between child and parent reports (posttest $\underline{r}$ = .18). Program and control group students rated their Feelings about School Climate at 13.1 and 13.8, respectively, with scale scores ranging from 4 to 16. Program group students scored an average of 20.4 on the Social Responsibility measure while control group students scored 21.9, with scale scores ranging from 8 to 24.

Family Bonding Moderators

An additional data set was prepared to assess the relationship of the parent survey completer (e.g., mother, father, other) to parent and child ratings of family bonding. As previously described, one parent was retained in the data set for each child. To maximize diversity for this analysis, all other guardians were selected over mothers and fathers were selected over stepmothers ($\underline{N}$ = 217). Which parent completed the parent survey at pretest did not turn out to be a significant moderator of the child's rating of bonding with

that parent at pretest. There were also no significant differences between fathers' and mothers' in pretest ratings of bonding with their children.

Program Procedures

Program group students attended an average of 25.0 group meetings, with a standard deviation of 4.7 and a range of 29 (from 7 to 36). Program staff had a mean of 8.3 individual contacts with students, with a standard deviation of 5.4 and a range of 26 (from 1 to 27). Program students also attended an average of 4.4 field trips (3.6 standard deviation, 17 range), while 106 youth and 35 of their parents attended summer camp. Program participation was much greater for the mothers than the fathers. Mothers participated significantly more in home visits, $t(212) = -12.19$, $p < .0001$, and in parent group meetings, $t(168) = -4.05$, $p < .0001$, than did fathers.

Correlations among program procedures varied from $r = .01$ between camping trips and father participation in parent groups, to $r = .91$ between field trips and mother participation in parent group meetings. While most of the observed correlations were predictable (e.g., $r = .80$ for mother and father participation in parent group meetings), unexpectedly large correlations with mother participation in home visits emerged for student attendance of group meetings ($r = .83$) and student participation in individual meetings ($r = .64$).

Costs

The cost analysis was accomplished in three stages, as follows:

- The total cost for each budget category was either obtained or derived from program records.
- The resources devoted to each procedure were estimated based on the allocation of direct service personnel for each procedure.

- The procedure costs were modified to reflect the amount of client participation in different procedures. The total cost for each procedure was broken down both by the number of clients who participated, and the number of participation episodes, to obtain the mean cost per participant and the mean cost per participation episode, respectively. These steps will be described in detail below.

Estimates of costs were based on descriptions of program procedures from program records and site visit reports written by a private contractor. Program budget records provided a total amount for the major budget categories, including salaried personnel (clerical services), travel, supplies, contractual (including a specific amount delineated for the evaluation component), and other (rows 9-13, column a, Table 4).

Table 4

Allocation of Major Resource by Program Procedures and Participants: Cohorts 1 - 3

	Procedures						
	a. Totals	b. Student Small Group Meetings (youth)	c. Individual Student Meetings (youth)	d. Field Trips (youth)	e. Camping Trips (youth)	f. Home Visits (parents)[a]	g. Parent Group Meetings (parents)
	Cost Per Procedure						
1. Total Number of Procedures	4,234 procedures	744 groups	1,252 meetings	35 trips	3 trips	2,181 visits[b]	19 groups
2. Length of Procedure	-	0 67 hours	0 50 hours	4.00 hours	104.00 hours [c]	1.00 hour	3.00 hours
3. Total Hours Per Procedure (R1Cb-g x R2 Cb-g)	-	498 5	626 0	140.0	312.0	2,181.0	57.0
4. Direct Service Personnel Per Procedure [d]	4	1	1	4	4	1	4
5. Direct Service Personnel Hours (R3Cb-g x R4Cb-g)	5341 5	498.5	626 0	560.0	1248.0	2181.0	228.0
6. Personnel Hours to Total Hours Ratio (R5a g / Ca)	1	0 093	0 117	0 105	0.234	0.408	0.043

	a. Totals	b. Student Small Group Meetings (youth)	c. Individual Student Meetings (youth)	d. Field Trips (youth)	e. Camping Trips (youth)	f. Home Visits (parents)[a]	g. Parent Group Meetings (parents)
				Personnel: Direct Service			
7. Prevention Specialists (R7Ca x R6Cb-g)[e]	*$365,504*	$34,110	$42,836	$38,319	$85,397	$149,240	$15,601
				Personnel: Indirect Service			
8. Project Director (R8Ca x R6Cb-g)	*$121,835*	$11,370	$14,279	$12,773	$28,466	$49,747	$5,201
9. Evaluation (R9Ca x R6Cb-g)	*$46,755*	$4,363	$5,479	$4,902	$10,924	$19,091	$1,996
10. Clerical Services (R10Ca x R6Cb-g)[f]	*$12,250*	$1,143	$1,436	$1,284	$2,862	$5,002	$523
				Miscellaneous Costs			
11. Travel (R11Ca x R6Cb-g)	*$9,714*	$907	$1,138	$1,018	$2,270	$3,966	$415
12. Supplies (R12Ca x R6Cb-g)[g]	*$9,425*	$880	$1,105	$988	$2,202	$3,848	$402
13. Other (R13Ca x R6Cb-g)[h]	*$33,341*	$3,111	$3,907	$3,495	$7,790	$13,614	$1,423
14. Total Procedure Cost (sum of R7-13)	*$598,824*	$55,884	$70,180	$62,781	$139,911	$244,508	$25,561

	a. Totals	b. Student Small Group Meetings (youth)	c. Individual Student Meetings (youth)	d. Field Trips (youth)	e. Camping Trips (youth)	f. Home Visits (parents)[a]	g. Parent Group Meetings (parents)
				Cost Per Client			
15. Number of Clients Participated[i]	169	152	153	137	105	150	39
16. Mean Cost Per Participant (R14Ca-g / R15Ca-g)[j]	$3,543	$368	$459	$458	$1,332	$1,630	$655
17. Number of Participation Episodes	8,001	3,765	1,252	587	105	2,181	111
18. Mean Client Cost Per Episode (R14Ca-g / R17Ca-g)	$75	$15	$56	$107	$1,332	$112	$230

Note. For 110 youth, complete data were available on all procedures. Dash indicates that the variable could not be computed. "R" means "Row," "C" means "Column."

[a]Parents refers to mothers/fathers or other guardians

[b]Estimate for home visit personnel refers to mothers only

[c]Camp youth participation estimates based on 4 24-hour days and 1 8-hour day

[d]Direct service staff consists of 4 prevention specialists

[e]Contractual services include personnel (prevention specialists and project director), camp, and evaluation activities

[f]Clerical services are the only salaried personnel; includes $9,500 salary and $2,750 fringe benefits.

[g]Supplies include group materials, parent education materials, videotapes, food for camping trips, refreshments for parent meetings, incentive items for student groups, T-shirts, buttons, brochures, printing, admissions for field trips, telephone, and mailing

[h]Other costs include rental for camping sessions, child care, and transportation for family meetings

[i]Total number of clients participated refers to all youth in the program group

[j]Total mean cost per client is not equal to the sum of mean costs per client per procedure because of the varying number of clients participating in different procedures

After subtracting the evaluation costs from the total contractual budget, the remaining contractual costs were allocated between the project director and the four prevention specialists based on the number of days (620 days for each prevention specialist, 640 days for the project director) and the number of personnel (4 prevention specialists, 1 project director) contracted for the three years of the program under consideration. The total number of days were calculated by multiplying the number of days for each position by the number of personnel in that position, resulting in a total of 3,120 work days. The total number of days contracted for the prevention specialists (620 days * 4 prevention specialists = 2,480 days) and the project director (640 days * 1 project director = 640 days) were then divided into the total 3,120 days to obtain a ratio of 80/20 prevention specialists to project director. That is, based upon the proportion of the total personnel budget it was estimated that 80% of remaining contractual costs should be allocated to the prevention specialists and 20% to the project director.

To these estimates, a five percent adjustment was made to increase the project director's salary relative to that of the program staff. This adjustment was estimated to reflect the increased status and responsibility of the project director position. While a larger adjustment could arguably have been allocated for the project director, a redistribution of costs would not affect the total estimated costs for each program procedure because indirect service costs were distributed in the same manner as direct service costs. Using the above procedure, it was determined that $365,504 of contractual costs were allocated to the prevention specialists and $121,835 to the project director (rows 7 and 8, column a, Table 4). Thus, by deriving the total budget cost for the contractual personnel, we had monetary totals for every major budget category (rows 7-13, Table 4).

Subsequent to obtaining the total cost for each budget category, we sought to break down the cost for each program procedure. While a rough estimate of costs for

each program procedure could have been made by dividing the total program cost by the number of procedures, this approach would not utilize all available information and might be inaccurate. Thus, the approach used was to make adjustments to the percentage of program costs allocated to each procedure based on length of the procedure and number of staff necessary to implement the procedure. Table 4 provides the equations used to allocate major resources to each program procedure. Throughout the text, the student small group meeting procedure will be used to illustrate the calculations.

The total number of procedures refers to the actual number of each procedural event (row 1, Table 4). For example, student small group meetings were held weekly from October through June (4.33 weeks per month * 9 months) and twice during the month of July for a total of 41.33 meetings at each school per year. This total was then multiplied by the six schools the program was implemented in and again by the three years of the program, for a total of 744 student small group meetings. The length of each program procedure, as shown in row 2, Table 4, was provided in program documentation for most of the procedures, with the exception of field trips. An estimate of four hours of procedure time was made for each field trip, based on program reports that field trips "...ranged from a few hours during the school year to all day trips during the summer." Student small group meetings were reported as 0.67 of an hour. Total procedure hours reflect the total amount of time for administration of program procedures (row 3, Table 4). For student small group meetings, a total of 498.5 hours resulted from multiplying the 744 groups by 0.67 hour per group.

The number of direct service personnel used to implement each procedure was obtained from program records and is shown in row 4, Table 4. Each student small group meeting was led by one prevention specialist, thus the number in this column is one. Direct service personnel hours (row 5, Table 4) were a product of total procedure hours (row 3, Table 4) and the number of direct service personnel per procedure (row 4, Table

4). For student small group meetings, 498.5 direct service personnel hours was the simple product of the number of direct service personnel per procedure (1) multiplied by the number of direct service personnel hours (498.5).

The personnel hours to total hours ratio (row 6, Table 4) is the proportion that resulted from dividing the personnel hours for each procedure into the total personnel hours. This proportion indicates how the direct service personnel were distributed across procedures (row 5, Table 4). The student small group meeting ratio of 0.093 was obtained by dividing the 498.5 direct service personnel hours by the total direct service personnel hours for the entire program (5,341.5). To determine the allocation of monetary costs for each program procedure, the personnel hours to total hours ratio (row 6, Table 4) was multiplied by the total amount for each budget category, including indirect service costs (rows 7-13, column a, Table 4). For example, the student small group meeting ratio of 0.093 was multiplied by the total budget amount allocated for prevention specialists ($365,504) to obtain the proportion of costs for this procedure that is spent on direct service personnel. The total cost per procedure (row 14, Table 4) was calculated by summing across all budget categories for each procedure separately (rows 7-13, Table 4). The total monetary cost (including direct service, indirect service, and miscellaneous costs) was $55,884.16 for the student small group meeting procedure (row 14, column b, Table 4).

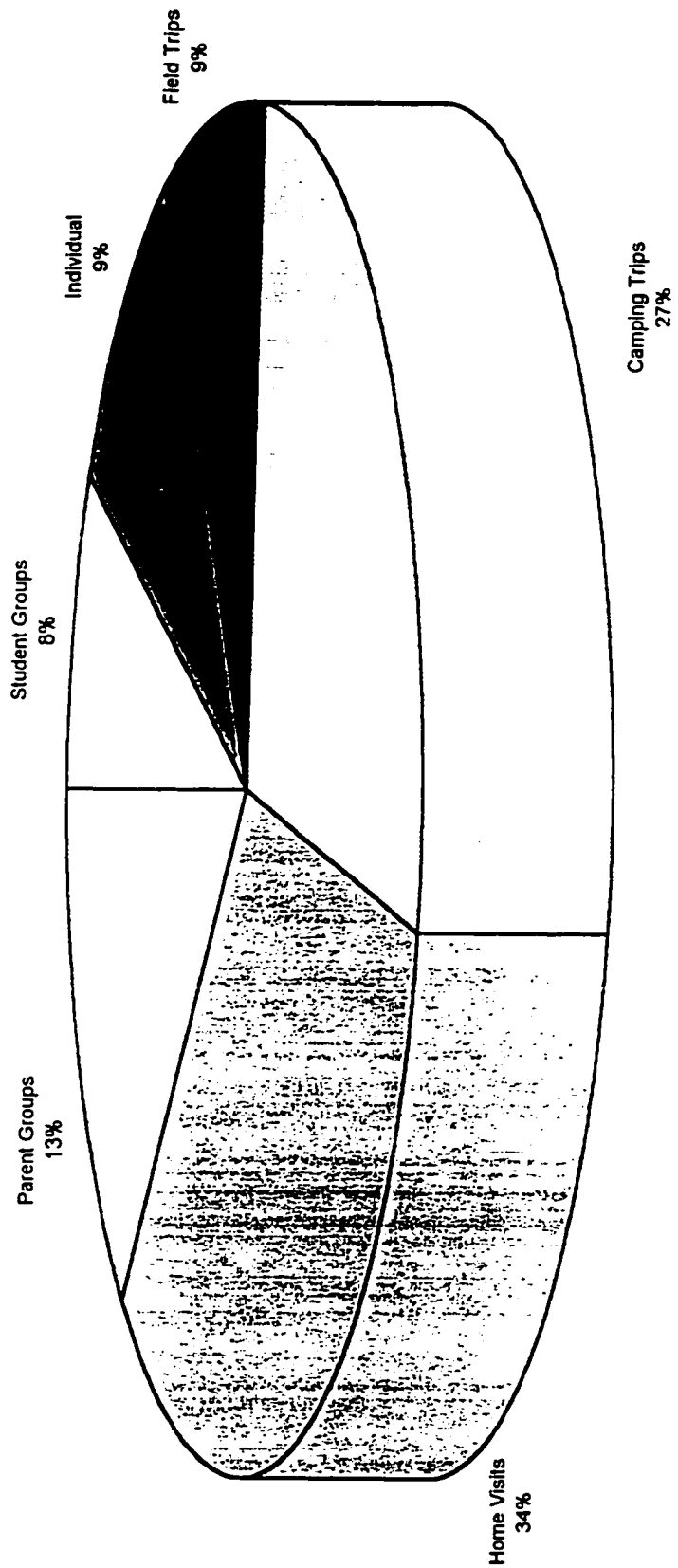
While the estimated cost of each procedure could stand alone, to the extent that clients participated to different degrees in different procedures it became necessary to modify that cost. Adjustments to the procedure costs were based on client participation, yielding mean cost estimates for both participants and for each event a client participated in (*participation episode*). These adjustments decrease the cost per client per procedure as participation in the procedure increases. Using available data on participation in program procedures generates a cost estimate that reflects utilization of resources by

people who remain in the program, thus allowing comparisons between costs and outcomes. Further, the cost per client varies to the degree that clients receive different amounts of a given procedure.

Whereas numbers in the previous 10 rows (5-14, Table 4) were obtained by calculation, the number of clients who participated (row 15, Table 4) was based on actual or observed data from program records. The total mean cost per participant (row 16, column a, Table 4) was obtained by dividing the total procedure cost (row 14, column a, Table 4) by the number of clients in the program group (row 15, column a, Table 4). This rough estimate was, however, not sufficient as it may elevate the numbers served and thus underestimate the cost of program procedures. To provide a more refined and accurate cost assessment, the mean cost per participant for each procedure (row 16, columns b-g, Table 4) was derived by dividing the total procedure cost (row 14, columns b-g, Table 4) by the number of clients that attended each program procedure, according to program records (row 15, columns b-g, Table 4). Figure 2 illustrates the percent of mean total cost per participant devoted to each program procedure.

Figure 2

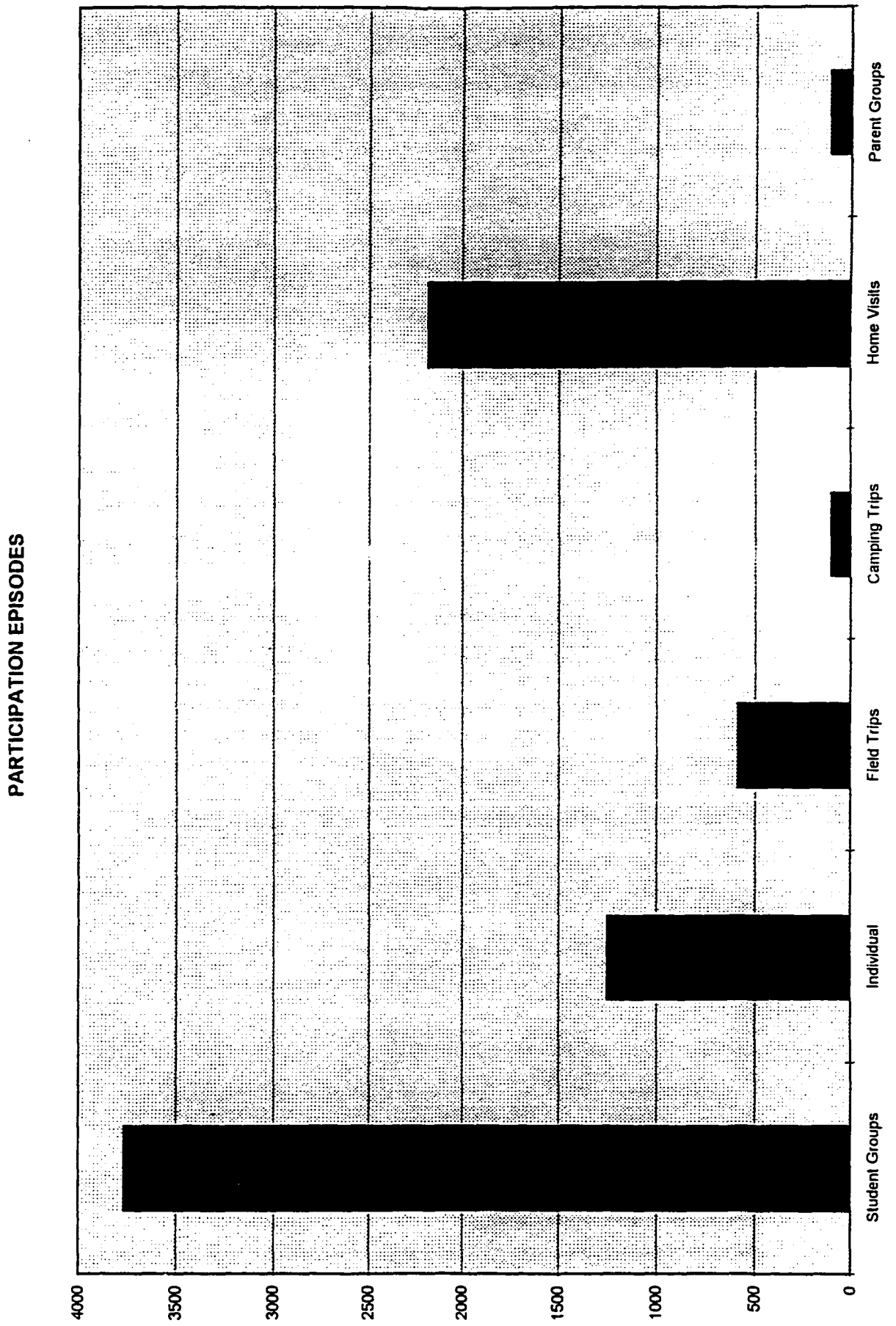
MEAN TOTAL COST PER PARTICIPANT



The mean cost per participant in the student small group meeting procedure was calculated by dividing the total procedure cost ($55,884) by the number of clients that participated in student small group meetings (152), for a mean cost of $368 per participant or 7.5% of the total cost per participant.

The number of participation episodes (row 17, Table 4) captures the total attendance by all clients in the program and reflects multiple participation in a single intervention (Figure 3).

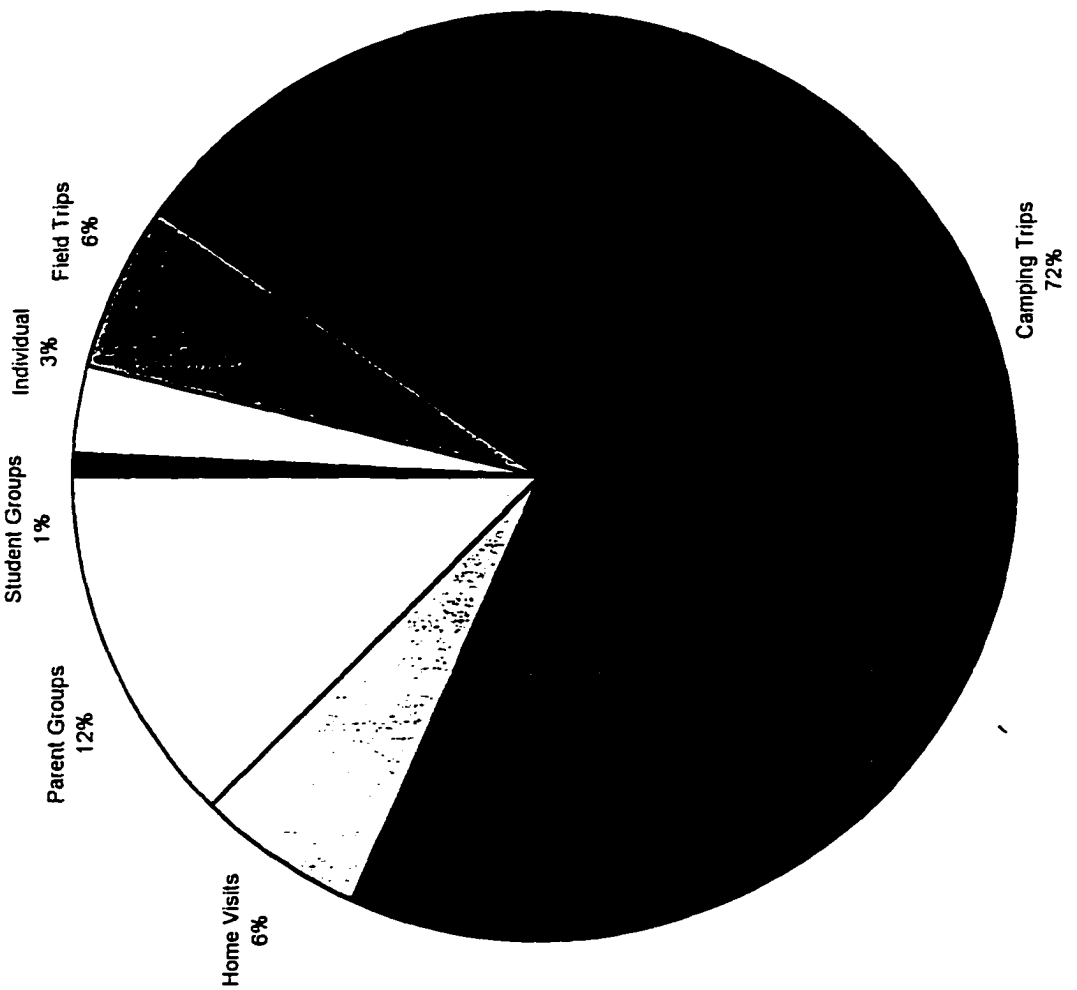
Figure 3



Records revealed that program youth participated a total of 3,765 times in student small group meetings. As shown in row 18, Table 4, the mean cost per client per episode was then calculated by dividing the total procedure cost (row 14, Table 4) by the number of participation episodes (row 17, Table 4). To illustrate, the total procedure cost of student small group meetings ($55,8844) was divided by the 3,765 participation episodes to yield a mean cost of $15 per participant per procedure. While the overall expense of the student small group meetings is quite high at over $55,000, the mean cost of each group meeting for each participant is rather modest, at $15 a meeting per child. Figure 4 depicts the percent of mean cost per client devoted to each procedure episode.

Figure 4

COST PER CLIENT PER PROCEDURE EPISODE



Thus, data from program records was used to estimate the allocation of costs for each (a) program procedure, (b) program participation episode, and (c) client.

Description of Cost Analysis

In the cost by procedure analysis, Table 4 illustrates that over half of the program procedures were home visits (row 1). Correspondingly, home visits account for $244,508 or over 40% of the program cost (row 14). Further, the prominence accorded to home visits is based on a conservative estimate of data for mothers only. Because the data set did not indicate whether one or two parents were in attendance at each home visit, and because 84% of participants were mothers, a decision was made to use data from the mothers only. Considering mother and father data separately, a total of 2,599 home visits would have been held, increasing the personnel hours to total hours ratio for home visits to 0.487. In contrast, the group meetings (parent and student small groups) were the least expensive procedures, accounting for four ($25,561) and nine ($55,884) percent of the total program costs, respectively (row 14, columns b and g).

In the cost by client analysis, it is clear that the procedures held in the schools, namely the student small group meetings and the individual student meetings, had the highest attendance levels (row 15, columns b and c). Because our estimate of cost per participant is a reflection of participation in the program, the activities with the highest attendance had the lowest mean cost per child relative to their total procedure cost. Whereas the camping trips cost almost twice as much as both the student small group meetings and the individual student meetings, almost 30% more students attended the two less expensive procedures (individual and group student meetings). Home visits were another well-attended intervention (row 15, column f).

Dividing by the number of clients who participated in each procedure, the home visits had by far the highest mean cost per participant ($1630) and accounted for one-third

or 34% of the total mean cost per participant (row 16, column f, see Figure 2). In contrast, student small group meetings averaged only $368 per participant, thus accounting for 8% of the total mean cost per participant (row 16, column b). Field trips also had a relatively low mean cost per participant at 9% of the total mean cost per participant or $458. However, both field trips and camping trips used volunteers (parent chaperons and counselors provided by the YMCA, respectively), and their services are not reflected in program costs. The total mean cost per client was $3,543 for each member of the program group (row 16, column a). This total is actually $1359 less than the sum of the mean cost per client across procedures ($4902) because not all program youth participated in each procedure (row 16, columns b-g).

Almost half of all client participation episodes were in the student small group meetings (row 17, column b, see Figure 3), thus resulting in the low mean cost per client per small group meeting of $15(row 18, column b). In contrast, there were only 105 participation episodes for camp, resulting in a high mean cost of $1,332 per camping trip (row 18, column e). Whereas student small group meetings accounted for only 7.5% of the total cost per client per procedure, camping trips accounted for 27% of the total client cost per participation episode (Figure 4). The mean cost for each of the 8,001 total participation episodes was $75 (row 18, column a). That is, the estimated cost of attending each program event was seventy-five dollars. The reader is reminded that these costs were not borne by program participants, but are provided here to illustrate estimated program costs. Monies for program operations were provided under a contract awarded by the Center for Substance Abuse Prevention, U.S. Department of Health and Human Services.

Analysis of Relationships Between Program Costs, Procedures, Bonding Processes, and ATOD Outcomes

In this section of the Results we discuss the relationships between CPPO variables by group (program versus control). To facilitate the reader's understanding of the analysis procedures and accompanying results, we organized the remainder of this section according to the study research questions. The following analyses were conducted separately to compare: (a) pretest-pretest, (b) posttest-posttest, (c) pretest-posttest change, and (d) pretest-posttest-followup measures. The relationships between variables were assessed at all of the above points in time to determine if a relationship existed at pretest and, if so, how it developed over time. Additionally, our analyses assessed if, following program completion, new relationships between variables were formed that were not evident at pretest.

The all-possible-regressions selection procedure was used to identify independent variables worthy of further consideration. This approach was used because of the high correlation among many of the independent variables (Neter, Wasserman, & Kutner, 1990). To ensure that the bivariate relationships found by this approach were not spurious or the result of exogenous variables such as age or race, hierarchical analyses (i.e., forward stepwise regression) were then conducted. The hierarchical analyses generally confirmed the relationships obtained by the all-possible-regressions procedure.

Bonding and ATOD Use

Significant and direct relationships were found between the processes of bonding and the prevention of ATOD use at pretest, posttest, and from pretest to posttest.

Pretest Relationships Between Bonding and ATOD Use

Each multiple regression (using the all-possible-regressions selection procedure) conducted for the three separate dependent measures was significant at pretest,

Willingness to Use Gateway ATODs, $F(5, 123) = 14.60$, $p < .0001$, Willingness to Use All ATODs, $F(5, 122) = 12.98$, $p < .0001$, and Use of Gateway ATODs, $F(5, 122) = 18.56$, $p < .0001$. Independent variables were only examined when the overall equation was significant. Of the five variables (Child Report of Communication with Mother, Child Report of Communication with Father, Parent Report of Communication with Child, Feelings about School Climate, and Social Responsibility) we examined our dependent measures against, only Social Responsibility was found to be significantly associated with either Use or Willingness To Use Gateway and all ATODs at pretest. As shown in Table 5, at pretest, students who scored high on the Social Responsibility measure were less Willing To Use Gateway ATODs, $T(129) = -6.65$, and all ATODs, $T(128) = -6.26$, and reported less actual Use of Gateway ATODs, $T(128) = -7.17$, all $ps < .0001$.

Table 5: Bonding - ATOD Outcome Regression Analysis 1:
Social Responsibility as a Predictor of ATOD Variables - Pretest Analysis

Variable	B	SE B	β	R^2_a
Willingness to Use Gateway ATODs				
Social Responsibility	-.43	.08	-.44	.23
Willingness to Use All ATODs				
Social Responsibility	-.45	.09	-.43	.21
Use of Gateway ATODs				
Social Responsibility	-.22	.03	-.54	.27

Because a correlation matrix showed that a number of the independent variables were highly correlated with Social Responsibility at pretest, a second series of multiple regressions was conducted without the Social Responsibility variable. All regressions were again found to be significant, Willingness to Use Gateway ATODs, $F(4, 133) = 4.52$,

$p < .005$, Willingness to Use All ATODs, $F(4, 132) = 4.25$, $p < .005$, and Use of Gateway ATODs, $F(4, 132) = 7.25$, $p < .001$.

These multiple regressions revealed that several of the other independent variables were significantly related to the dependent ATOD use variables at pretest, including Child Report of Communication with Mother, Feelings about School Climate, and Parent Report of Communication with Child (Table 6).

Table 6: Bonding - ATOD Outcome Regression Analysis 2
Additional Variables Predicting ATOD Use - Pretest Analysis

Variable	B	SE B	β	R^2_a
Response Variable: Willingness to Use Gateway ATODs				
Child Report: Communication with Mother	-.17	.08	-.21	.09
Feelings about School Climate	-.28	.11	-.21	.09
Response Variable: Willingness to Use All ATODs				
Child Report: Communication with Mother	-.18	.09	-.20	.09
Feelings about School Climate	-.31	.13	-.21	.09
Response Variable: Use of Gateway ATODs				
Feelings about School Climate	-.15	.04	-.32	.16
Parent Report: Communication with Child	-.04	.02	-.18	.16

Students who reported good Communication with Mother reported less Willingness to Use Gateway ATODs, $T(138) = -2.07$, $p < .05$, and Willingness to Use All ATODs, $T(137) = -2.00$, $p < .05$. Students who had more positive Feelings about School, also reported less Willingness to Use Gateway ATODs, $T(138) = -2.50$, $p < .05$, all ATODs, $T(137) = -2.44$, $p < .05$, and less actual Use of Gateway ATODs, $T(137) = -3.90$, $p < .0005$. Students also reported less Use of Gateway ATODs when their parents reported good Communication with Child, $T(137) = -2.2$, $p < .05$.

A third series of multiple regressions was run, again removing those significant variables that were highly correlated with other independent variables at pretest. As shown in Table 7, the only significant equation for this third process-outcome regression analysis was Use of Gateway ATODs, $F(3, 133) = 4.16$, $p < .01$.

Table 7: Bonding - ATOD Outcome Regression Analysis 3:
Mother-Child Communication as a Predictor of ATOD Use - Pretest Analysis

Variable	B	SE B	β	R^2_a
Response Variable: Use of Gateway ATODs				
Child Report: Communication with Mother	-.06	.03	-.20	.07

The only independent variable that emerged as significant was Child Report of Communication with Mother, $T(137) = -2.00$, $p < .05$. Thus, at pretest, children who reported good communication with their mothers, used less gateway ATODs.

The above series of multiple regressions indicated that the following additional variables were significant predictors of the dependent variables at pretest: Child's Report of Communication with Mother, Student's Feelings about School, and Parent Report of Communication with Child (Tables 7-8). Thus, with the exception of the family bonding measure of Child's Report of Communication with Father, all of the other process variables were significantly related to the outcome variables at pretest (Tables 6-8). As these results indicate, the hypothesized family, school, and societal bonding processes are strongly and inversely associated with willingness to use and use of ATODs.

Posttest Relationships Between Bonding and ATOD Use

Tests of the process-outcome relationships at posttest supported the strong relationship between social and school bonding and the ATOD use variables; however, there was no evidence of a relationship between family bonding and ATOD use. Non-significant family bonding processes included, Parent Report of Communication with

Child, Child Report of Communication with Mother, and Child Report of Communication with Father, all ps > .05. The composite measure of Child Report of Communication with Mother and Father was also not significant for all ATOD outcome variables at posttest when tested both with and without the Social Responsibility variable, ps > 24.

As with the pretest, process-outcome analysis, each multiple regression conducted for the three ATOD use measures was significant at posttest, Willingness to Use Gateway ATODs, $F(5, 119) = 8.55$, $p < .0001$, Willingness to Use All ATODs, $F(5, 118) = 7.72$, $p < .0001$, and Use of Gateway ATODs, $F(5, 117) = 10.10$, $p < .0001$. For the first multiple regression conducted, Social Responsibility was again found to be the only significant variable for all three outcome measures, Willingness to Use Gateway ATODs, $T(125) = -5.14$, Willingness to Use All ATODs, $T(124) = -4.91$, and Use of Gateway ATODs, $T(123) = -6.35$, all ps < .0001 (Table 8).

Table 8: Bonding - ATOD Outcome Regression Analysis 1: Social Responsibility as a Predictor of ATOD Variables - Posttest Analysis				
Variable	B	SE B	β	R^2_a
Response Variable: Willingness to Use Gateway ATODs				
Social Responsibility	-.49	.07	-.56	.35
Response Variable: Willingness to Use All ATODs				
Social Responsibility	-.53	.08	-.54	.32
Response Variable: Use of Gateway ATODs				
Social Responsibility	-.18	.03	-.57	.41

A second series of multiple regressions conducted without the Social Responsibility variable was significant for Willingness to Use Gateway ATODs, $F(4, 123) = 3.22$, $p < .05$ and Willingness to Use All ATODs, $F(4, 122) = 2.91$, $p < .05$. As shown in Table 9, these multiple regressions revealed that students who reported more positive Feelings about School reported less Willingness to Use Gateway ATODs, $T(128) = -2.3$, $p < .05$ and less Willingness to Use All ATODs, $T(127) = -2.2$, $p < .05$.

Table 9: Bonding - ATOD Outcome Regression Analysis 2: Feelings about School as a Predictor of ATOD Variables - Posttest Analysis				
Variable	B	SE B	β	R^2_a
Response Variable: Willingness to Use Gateway ATODs				
Feelings about School	-.29	.08	-.21	.07
Response Variable: Willingness to Use All ATODs				
Feelings about School	-.30	.14	-.20	.06

A third series of multiple regressions conducted without the Social Responsibility and Feelings about School variables was not significant for any of the dependent variables, all ps > .05. Thus, while society and school bonding processes remained consistently linked to ATOD use outcomes, family bonding was no longer a significant process at posttest.

Pretest to Posttest Relationships Between Bonding and ATOD Use

Change in societal bonding processes from pretest to posttest were also linked with change in pretest to posttest ATOD outcomes, Willingness to Use Gateway and all ATODs, F(5, 90) = 2.51, p < .05, and Use of Gateway ATODs, F(5, 88) = 6.26, p =.0001 (Table 10).

Table 10: Change in Bonding Processes - Change in ATOD Outcomes Regression Analysis: Pretest to Posttest Analysis

Variable	B	SE B	β	R^2_a
Response Variable: Willingness to Use Gateway ATODs				
Social Responsibility	-.28	.10	-.29	.07
Response Variable: Willingness to Use All ATODs				
Social Responsibility	-.29	12	-.26	.05
Response Variable: Use of Gateway ATODs				
Social Responsibility	-.16	.03	-.53	.22

The more socially responsible students became, the less willing they were to use gateway ATODs, T (96) = -2.70, p = .008, and the less they had actually used gateway ATODs, T (94) = -5.30, p < .0001. Conversely, students who became less socially responsible, reported higher levels of willingness to use and use of ATOD's. These results indicate that

social bonding processes are not simply related to ATOD outcomes, but that change in social bonding processes is related to change in Willingness to Use and actual Use of Gateway ATODs.

Program Participation and Bonding

Procedures were first examined including both program and control groups and then for the program group alone. As with the bonding → ATOD outcome analysis, a 2-stage criterion was used whereby a multiple regression was considered significant if the overall F was significant, and only then were the individual T's considered.

Across all subjects, the only process variables that were significantly related to individual program procedures at posttest were the composite measure of Communication with Mother and Father, $F(8, 102) = 2.27$, $p = .03$, and Social Responsibility, $F(8, 137) = 4.45$, $p = .0001$. Higher attendance in student group meetings was related to lower communication with parents as reported by the students, $T(110) = -2.77$, $p = .007$. The more home visits the fathers participated in, the more socially responsible students were at posttest, $T(145) = 2.57$, $p = .01$. However, when analyzed separately for boys and girls, the relationship between fathers' involvement in home visits and Social Responsibility (or change in Social Responsibility) was not significant, $p > .08$. This relationship was also not significant when analyzed using the forward stepwise regression procedure, $p = .48$. This analysis revealed that gender of the child was the critical variable in determining change in Social Responsibility, with girls showing a greater decline in Social Responsibility than boys, $F(1, 100) = 4.99$, $p = .03$, $T(102) = -2.23$, $p = .03$.

The significant group difference in Social Responsibility observed at pretest was widened at posttest, with the program group showing a decline in Social Responsibility relative to the control group, $p < .0001$. An unexpected but related finding was that the more student groups a youth participated in, the less socially responsible they were at

posttest, T (145) = -3.75, $p < .05$. The decline in the critical process of Social Responsibility that is associated with participation in the program has a particular impact on girls. While program group girls were significantly higher than boys in Social Responsibility at pretest, $p < .001$, girls in the program group decreased in Social Responsibility such that there were no significant gender differences at posttest, $p = .13$. Gender did not significantly interact with group to produce the low levels of Social Responsibility evident in the program group, $p > .80$.

Participation in the program group also was related to decreased levels of Communication with Mother, T (178) = 3.16, $p = .002$, and Communication with Father, T (139) = 2.02, $p = .045$, at posttest. This finding supports the earlier analysis linking higher participation in student group meetings to decreased communication with both parents. Whereas the control group showed slight increases in children's reported levels of communication with their parents, the program group showed declines in communication with both mothers and fathers. Differences between groups on these family bonding variables were not evident at pretest. These differences emerged despite the increased concordance (from pretest to posttest) between child and mother reports of their communications. Program and control groups did not differ in levels of Social Responsibility or Communication with Mother or Father at the followup testing, $ps > .11$. Participation in the program versus control group was not significant for any of the other process variables at posttest, $ps > .10$.

No significant findings were found when analyses were performed of the program group alone, all $ps > .05$. Thus, there may be a greater difference between program and control groups than within the program group in terms of the effect of participation on process measures. In other words, degree of program implementation did not have a significant effect on the process variables.

Program Participation and ATOD Outcomes

At posttest, the program group reported significantly higher levels of Willingness to Use Gateway ATODs, $t(185) = -2.29$, Willingness to Use All ATODs, $t(185) = -2.29$, and Use of Gateway ATODs, $t(183) = -2.25$, than the control group, $ps < .05$. However, this difference may represent a temporary fluctuation as the two groups reported equivalent levels of use at the first and second follow-ups, $ps > .09$.

To investigate the course of ATOD outcome variables over time, an analysis of variance for repeated measures was conducted on all the ATOD scale scores using pretest scores as a covariate. We initially present adjusted means from the pretest-posttest analysis (entire sample) for the first two testing periods. We also compare program and control groups to the lower risk baseline group at posttest. Next, we present data from cohorts 1 and 2 to examine differences between groups at followup testing occasions. See Figures 5 through 7 for illustrations of Willingness to Use Gateway ATODs, Willingness to Use All ATODs, and Use of Gateway ATODs by cohort over time.

When examining the complete data set (Cohorts 1-3), the repeated measures ANOVA indicated that the program group reported significant increases in Willingness to Use Gateway ATODs, $F(1, 181) = 5.01$, and Willingness to Use All ATODs, $F(1, 179) = 4.64$, from pretest to posttest relative to the control group, $ps < .05$. The program group moved from a mean score of 7.56 at pretest on the Willingness to Use Gateway ATODs scale (program pretest mean Willingness to Use All ATODs = 9.73) to a mean willingness of 8.26 at posttest (program posttest mean Willingness to Use All ATODs = 10.40). In contrast, the control group declined on the Willingness to Use Gateway ATODs scale from a mean score of 7.19 at pretest to a mean score of 7.17 at posttest (control pretest mean Willingness to Use All ATODs = 9.29, control posttest mean Willingness to Use All ATODs = 9.26). These significant differences emerged despite the fact that there were

significant effects for the covariates (Willingness to Use Gateway ATODs, $F(1, 181) = 16.46$ and Willingness to Use All ATODs, $F(1, 179) = 14.22$, $ps < .0001$).

The pretest scale score for Use of Gateway ATODs was also significant, $F(1, 174) = 27.89$, $p < .0001$, and resulted in a non-significant effect of group, $p = .10$. While the program group moved from a mean scale score of 6.58 to 6.85 Use of Gateway ATODs from pretest to posttest, the control group showed a similar increase from a pretest mean of 6.27 to a posttest mean of 6.44 Use of Gateway ATODs. While trends in the data seemed to suggest that the program increased ATOD use and willingness to use for girls more than boys, the effect of group by gender was not significant for any of the ATOD outcome scores, $ps > .55$. Group assignment also did not significantly interact with time (pretest to posttest) or with for any of the ATOD outcome scores, all $ps > .18$. It should be noted that the overall increase in willingness to use and use of ATODs over time was expected because of the progression of students from childhood to adolescence.

The program's higher levels of overall ATOD use at posttest relative to the control group is based on use of the following substances: cigarettes, $\chi^2(1, n = 182) = 7.53$, wine or wine coolers, $\chi^2(1, n = 182) = 4.40$, and liquor, $\chi^2(1, n = 182) = 4.00$, $ps < .05$. As noted earlier, chi-square tests were used for examining categorical variables. Program and control groups did not differ in their use of chewing tobacco, marijuana, cocaine, or beer at posttest, $ps > .33$, nor did groups differ at posttest on measures of willingness to use any individual ATOD, $ps > .17$.

A comparison of posttest outcome data between program, control, and baseline groups for Cohort 3 revealed that the program group was significantly higher than both the control and baseline groups on all ATOD measures (Willingness to Use Gateway ATODs, $F(2, 326) = 6.56$, Willingness to Use All ATODs, $F(2, 325) = 6.01$, and Use of Gateway ATODs, $F(2, 315) = 3.27$, $ps < .05$). There were no significant differences between the three groups for the first cohort, $ps > .05$.

Follow-up testing for Cohort 1 indicated that there were no significant differences between program and control groups in Willingness To Use or Use of ATODs at the first and second followups when pretest scores were used as covariates, ps > .11. The pretest scores were, however, all significant with the program group indicating higher levels of Willingness to Use Gateway ATODs, F(1, 50) = 6.59, Willingness to Use All ATODs, F (1, 102) = 5.90, and Use of Gateway ATODs, F (1, 43) = 5.93, ps < .05. Thus, while all participants' ATOD use attitudes and behavior changed over time, program and control groups did not significantly differ in their rates of change from their pretest scores.

High family involvement in the program was related to lower Willingness to Use Gateway and All ATOD's at the second followup for the first cohort, F(1,27) = 6.26 and 6.65, respectively, ps < .02. This finding remained significant when tested against the powerful Social Responsibility predictor, ps < .05. However, this analysis included only program group students and the small sample size on which the finding is based is noted and further commented on in the Discussion. Family attendance in the program was not significantly related to any ATOD's outcomes when both program and control groups were analyzed together, ps > .15. Further analyses including the Social Responsibility variable failed to demonstrate that the family attendance variable adds additional predictive power.

For Cohort 2, no significant differences were found between groups for the ATOD Willingness measures, ps > .26; the pretest Willingness scores also were not significant covariates, ps > .63. The Cohort 2 pretest scores for Use of Gateway ATODs were significant, however, with the program group indicating higher levels of use at pretest, p < .005. Using this pretest score as a covariate resulted in a non-significant effect of group, p = .18. While both program and control groups appeared more Willing To Use Gateway ATOD's than their counterparts in the first of three cohorts (Figure 5), this discrepancy is

neither apparent in their Use of All ATOD's (Figure 6) nor their actual Use of Gateway ATOD's (Figure 7).

Figure 5
WILLINGNESS TO USE GATEWAY ATOD'S BY COHORT

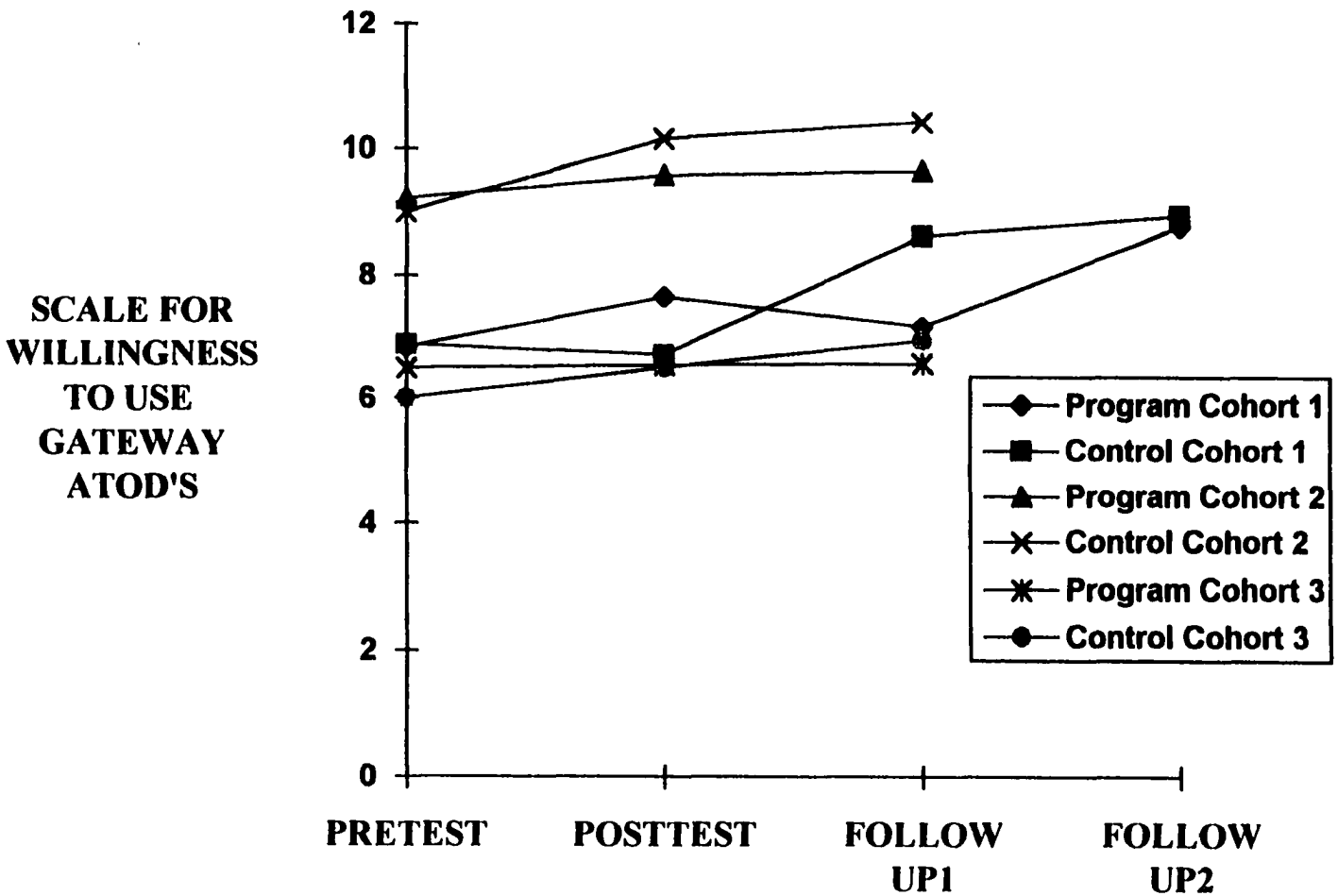


Figure 6

WILLINGNESS TO USE ALL ATOD'S BY COHORT

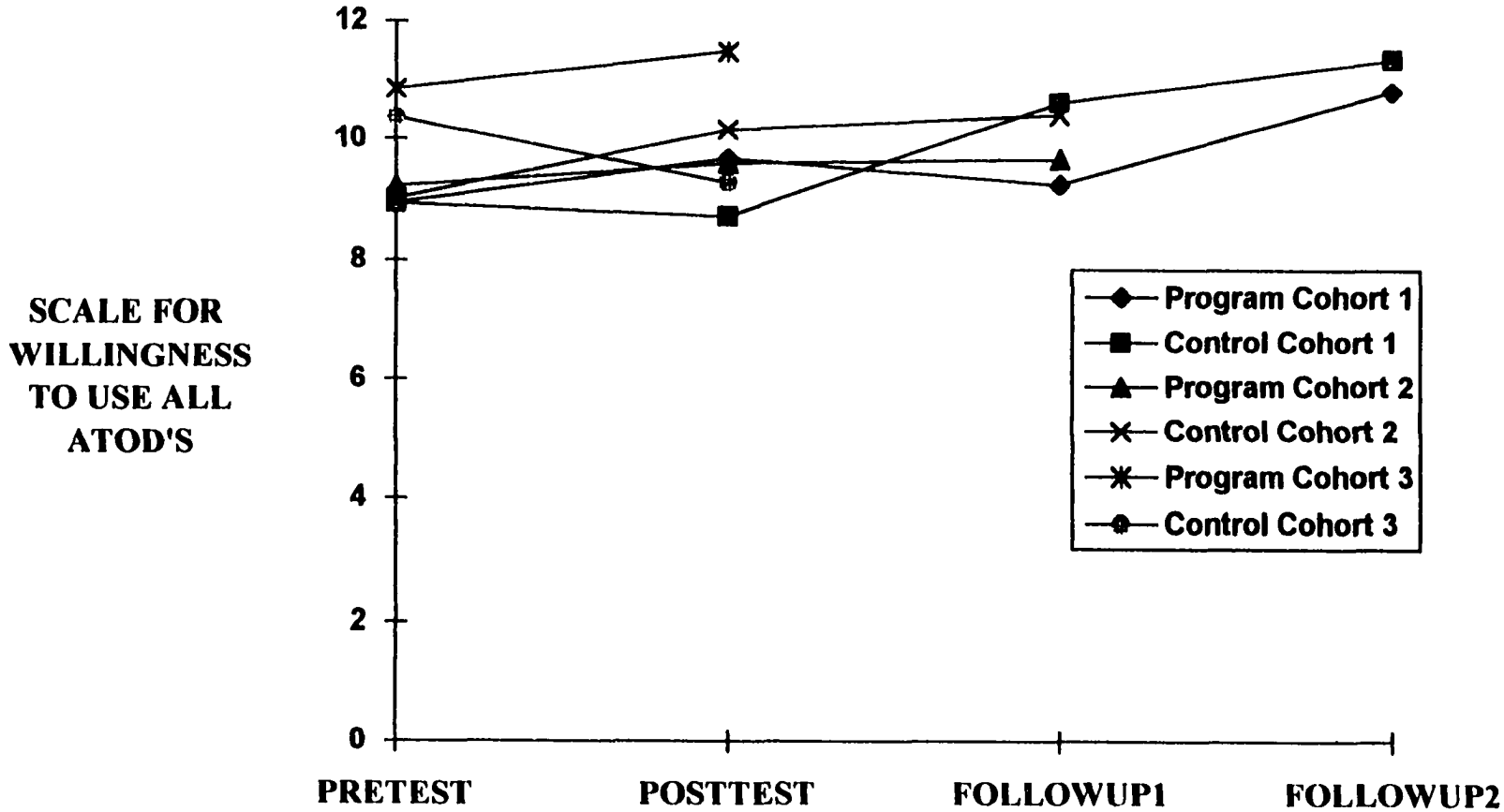
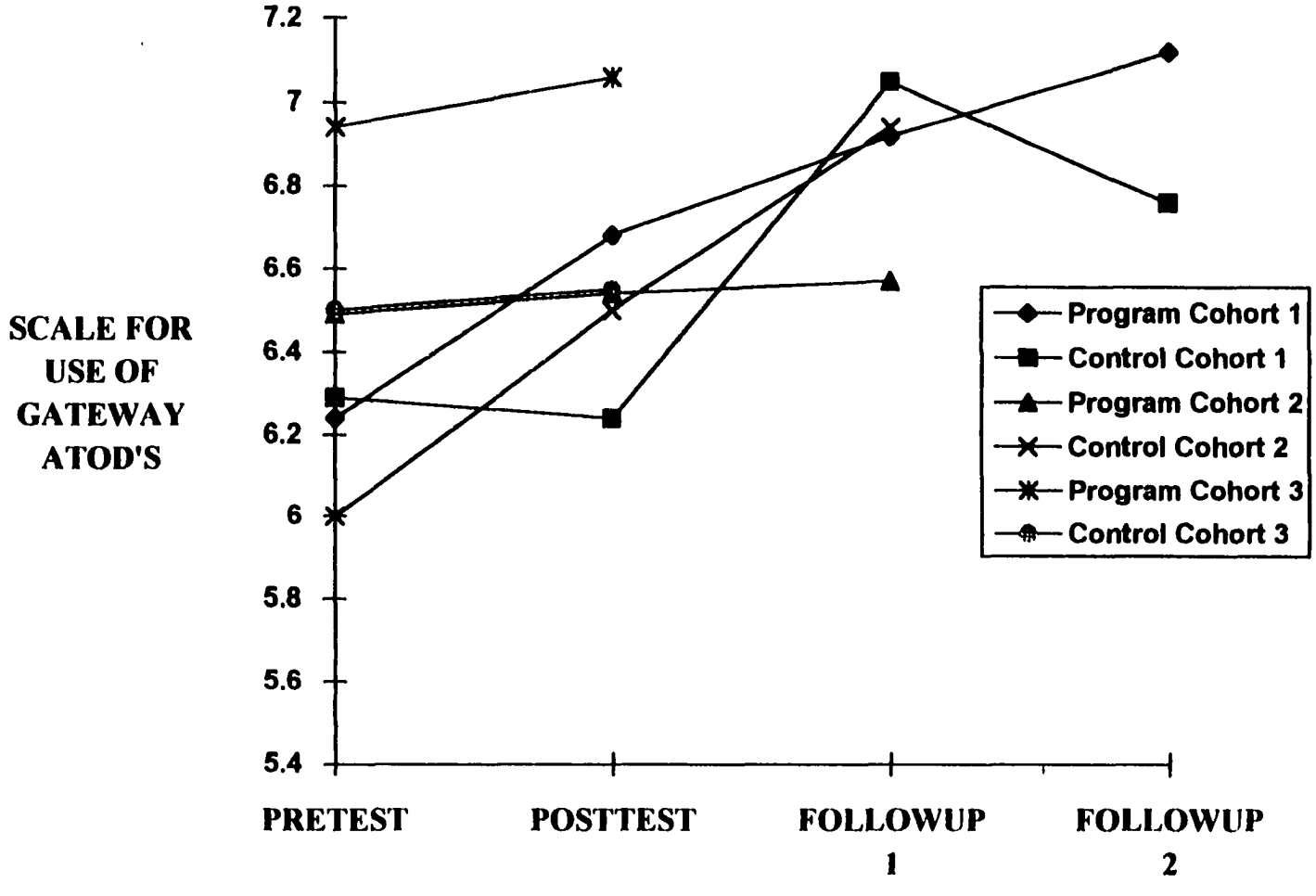


Figure 7
USE OF GATEWAY ATOD'S BY COHORT



Multiple regression tests did not reveal any significant relationships between individual program procedures, analyzed for program and control groups together as well as for the program group separately, and ATOD use outcomes, all ps > .05. Program and control groups also did not differ in terms of their use or willingness to use ATODs over time (from pretest to posttest), all ps > .05.

A measure of family involvement was also considered to determine if a higher "dose" of the program resulted in worse outcomes. While increased family attendance was related to increased Willingness To Use Gateway ATOD's, $F(1, 172) = 7.16$, Willingness To Use All ATOD's, $F(1, 171) = 6.92$ and actual Use of Gateway ATOD's, $F(1, 167) = 4.59$, ps < .05, this effect was only significant when looking between groups. When analyzing within the program group, no significant differences emerged for families with varying levels of program attendance, ps > .07. This finding did not appear to be due to sampling a restricted range, as family attendance ranged from participation in 0 to 124 activities, with a mean of 39.18 program activities per family. Thus, there did not appear to be a "dose-response" relationship for outcome, as higher levels of participation did not appear to worsen ATOD outcomes.

Cost-effectiveness

Cost-effectiveness indices (CEI's) were generated to determine how much change in ATOD use behaviors and attitudes was achieved per dollar spent for each child, using procedures originally developed by Yates, Haven, and Thoresen (1979). While many possible definitions of outcome could be used, we decided to use a variable of change (posttest-pretest) because a single posttest measure would not account for differences in pretest outcome measures that were observed despite expectations due to random assignment. Percentage change was used instead of the actual means because the ATOD outcome measures were based on different scales. CEI's were formed by dividing the cost

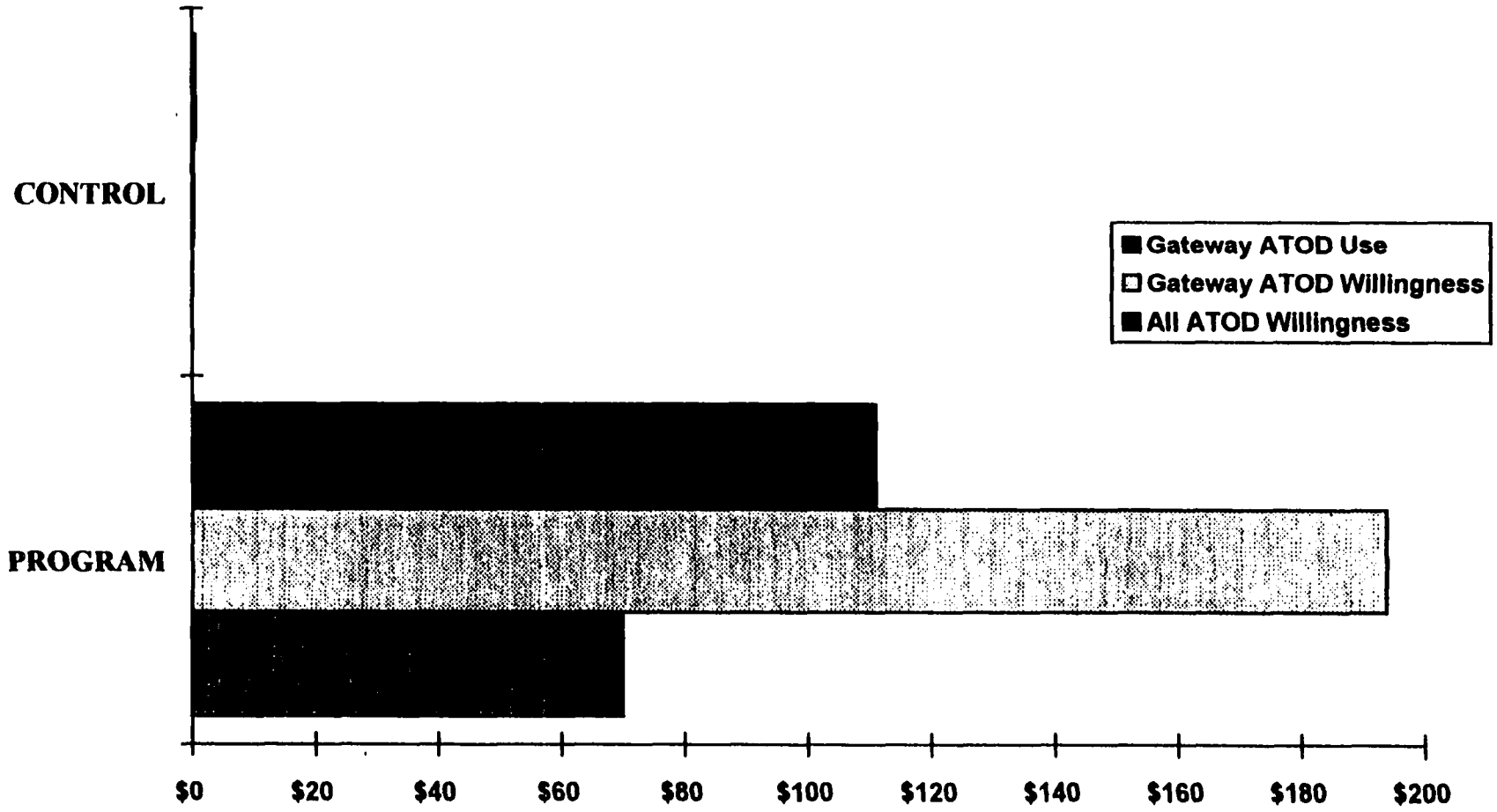
per child by the difference between the means of the effectiveness variables for each child converted into percentage change, as shown in the following equation.

$$\text{CEI} = \frac{\text{Cost per child}}{(\text{Mean posttest ATOD outcome score} - \text{Mean pretest ATOD outcome score} * 100)/\text{scale range}}$$

where cost per child = (attendance in program procedures * $75 for mean client cost per participation episode)

Figure 8 displays mean CEI's for program and control groups.

Figure 8
COST-EFFECTIVENESS: COST PER CHILD PER OUTCOME



We estimated a measurement cost of $25.00 for each youth in the control group. The measurement cost for program youth was included in the calculation of mean cost per client per participation episode.

To interpret the values of the CEI's generated by the above equation, the reader should keep in mind that a positively signed CEI means that an increase in ATOD use and willingness to use occurred; whereas, a negatively signed CEI means that ATOD outcomes decreased. Therefore, a CEI that is a large number with a negative sign indicates that a smaller decline in ATOD Use or Willingness To Use has occurred than would be indicated by a CEI that is large in number and negative in sign. It is also important to note that differences between indices could be caused by a change in outcome or a change in cost. An increase in cost-effectiveness could be achieved by reducing ATOD Use or Willingness To Use, or decreasing cost, or both.

Comparison of the cost-effectiveness indices in Figure 8 suggest that while the control group displays zero to slight increases in youth ATOD use and willingness to use for a nominal cost, the program group expends a high cost per child for robust *increases* in ATOD use and willingness to use.

Multiple regressions conducted to test for relationships between mean cost per youth and change (posttest - pretest and followup - pretest) in ATOD outcome variables were not significant, all $ps > .05$.

Demographics and Bonding

Parents' reports of their communication with their children was the only process variable significantly related to client race at pretest, $F(2, 169) = 6.08$, $p = .003$. As noted earlier, at pretest African-American and Hispanic parents reported significantly higher levels of Parent-Child Communication than Caucasians, according to the least significant difference (LSD) test, $p < .05$. At posttest, the racial difference in Parent-Child

Communication was still significant, $F(2, 175) = 3.70$, $p < .05$, with Hispanics significantly higher than Caucasians and African-Americans, LSD test, $p < .05$. Parent-Child Communication fell significantly for all participants from pretest to posttest, $p < .05$. The change in Parent-Child Communication by race was also significant, $F(2, 164) = 3.06$, $p < .05$, with Caucasians dropping the least over time. Thus, while Hispanic and African-American parents reported the highest levels of Parent-Child Communication at pretest, their communication with their children declined more precipitously than Caucasians, perhaps representing a regression to the mean. At posttest, however, Hispanic parents still reported the highest levels of communication with their children.

As noted earlier, Social Responsibility was significantly related to gender at pretest, $F(1, 176) = 18.27$, $p < .0001$. By posttest, the girls had dropped in Social Responsibility such that the gender difference was no longer significant, $p = .13$. The change in Social Responsibility from pretest to posttest was significant for gender, $F(1, 173) = 7.24$, $p < .008$. The significant relationship found between fathers' involvement in home visits and Social Responsibility, with more involvement related to greater social responsibility, was not significant when analyzed by gender (See Program Participation and Bonding). However, the interaction between gender and time for Social Responsibility remained significant when the effect of father involvement in home visits was removed. Gender differences were not significant for any of the other process variables, $ps > .11$. Unlike Parent-Child Communication, there were no significant racial differences in changes in Social Responsibility, $ps > .10$.

The other attribute variables (age and total risk score) were not significantly related to the process measures at pretest, posttest, or from pretest to posttest and followup, $ps > .14$.

Demographics and ATOD Outcomes

There were no differences at pretest or posttest between racial groups on scale measures of Willingness To Use or Use Of ATODs, *ps* > .60 In contrast, *t*-tests for independent samples indicated that initial gender differences in ATOD use and willingness to use were absent at posttest, *ps* > .18. While boys' level of use and willingness to use ATODs increased slightly from pretest to posttest, girls' showed a much sharper increase in use and willingness to use from pretest to posttest, thus resulting in no significant sex differences at posttest (Figures 9 & 10).

FIGURE 9
USE OF GATEWAY ATOD's BY GENDER

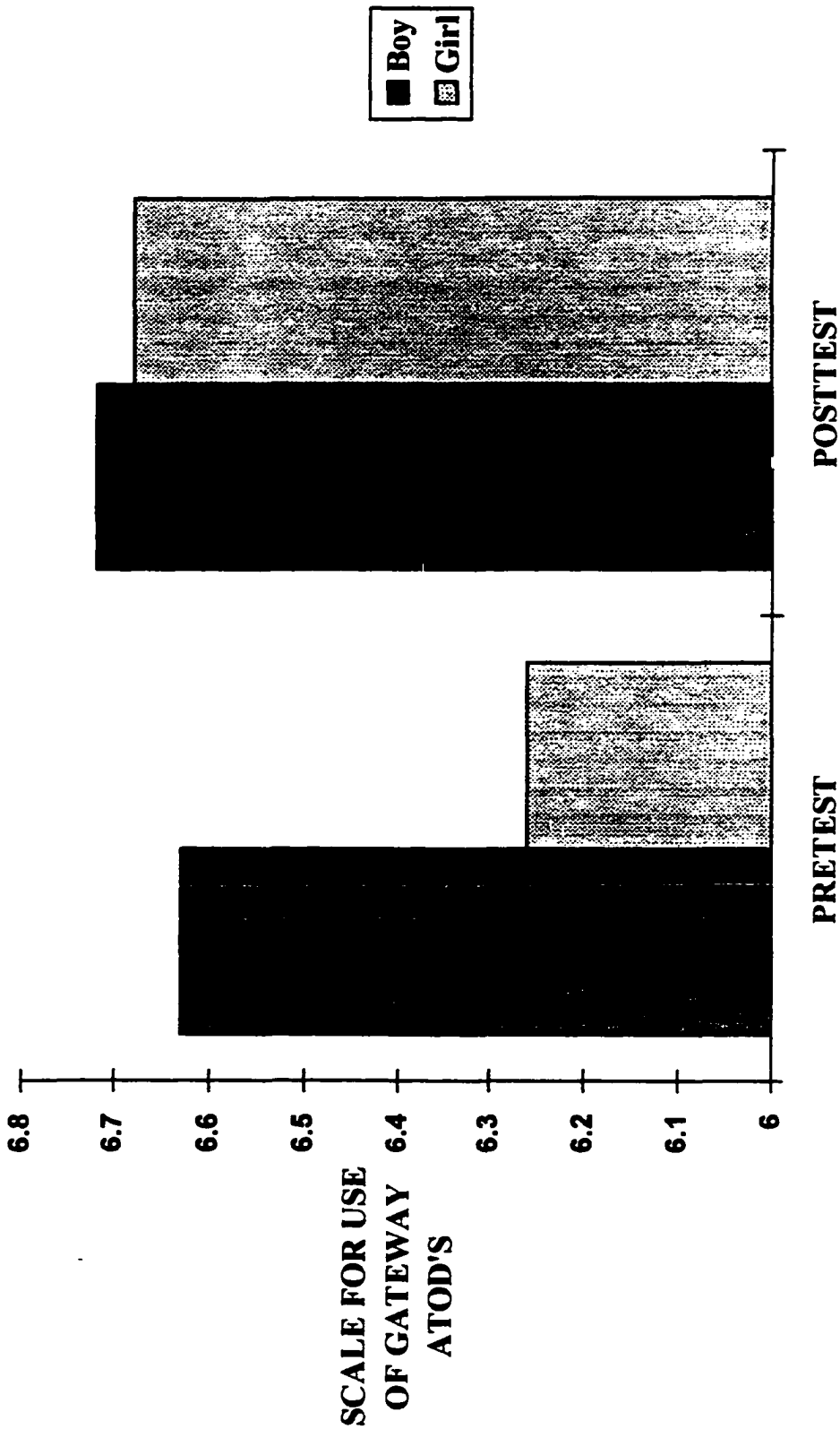
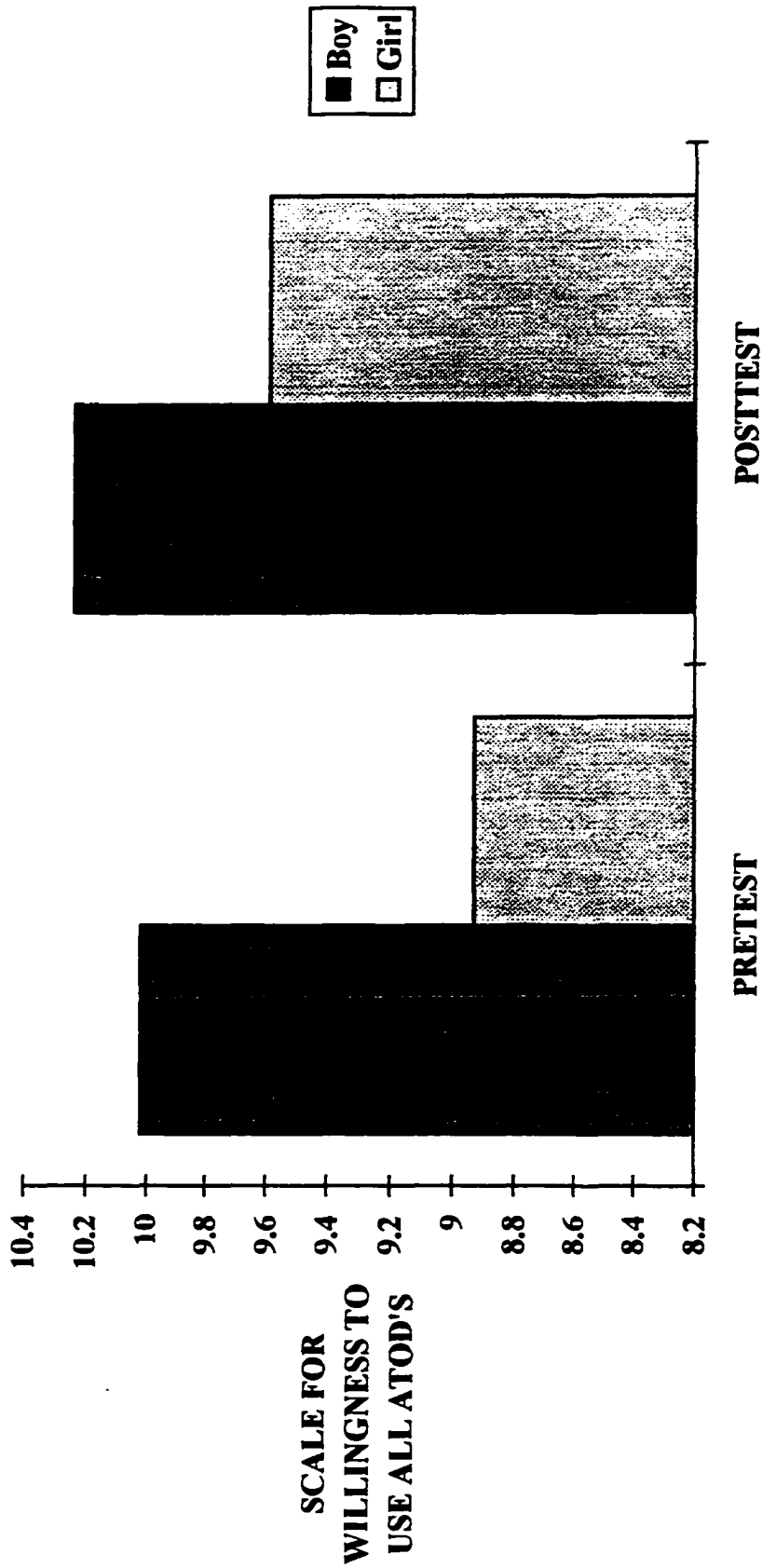


FIGURE 10
WILLINGNESS TO USE ALL ATOD'S BY GENDER



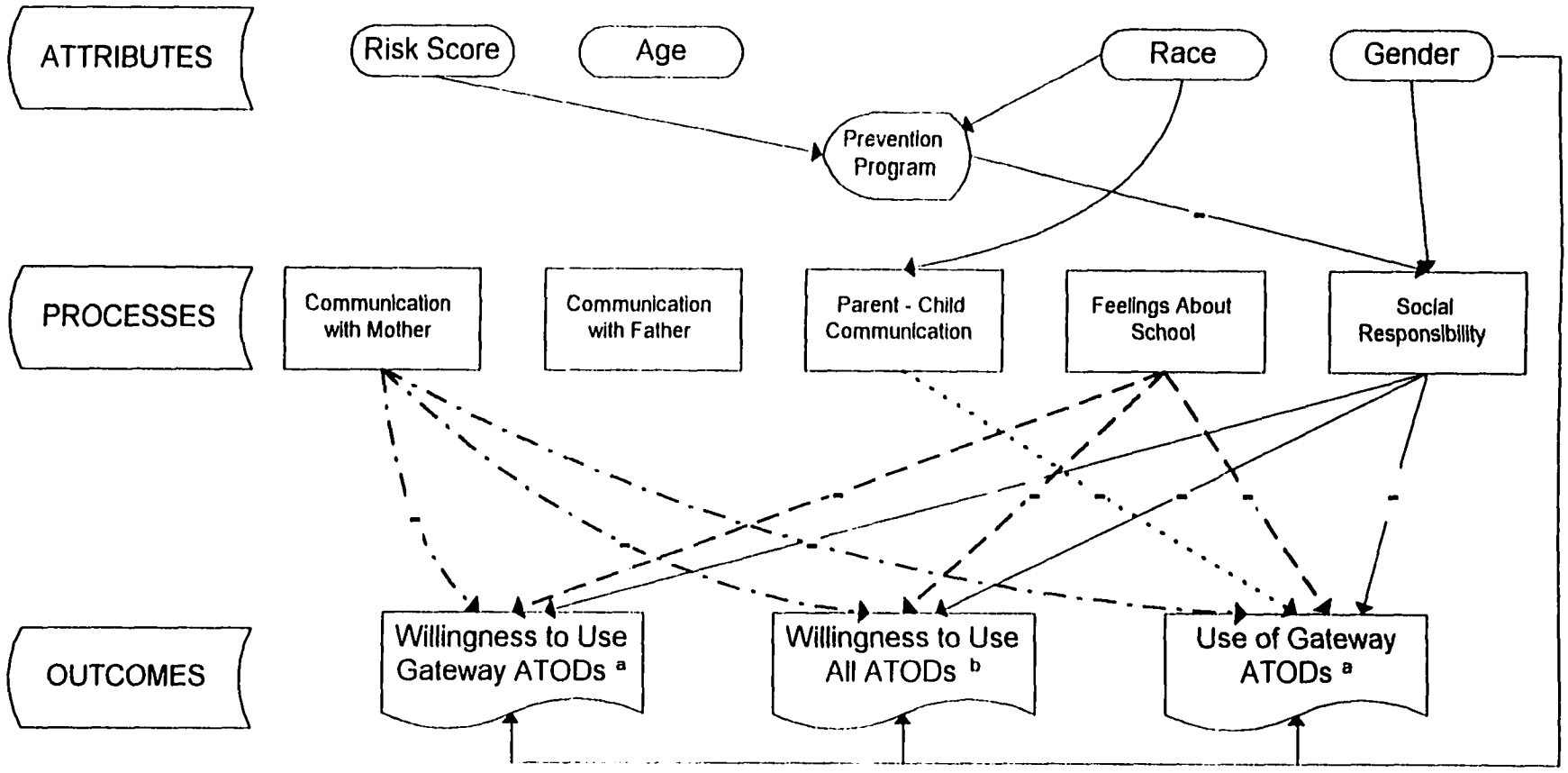
Repeated measures ANOVA's indicated that gender did not significantly interact with time or with group to produce this finding, ps > .23. Neither race nor gender were significantly related to the trend in ATOD outcome scores from pretest to posttest, ps > .22. Age and risk total were not significantly related to ATOD outcomes at posttest or followup ps > .39.

CHAPTER 4

DISCUSSION

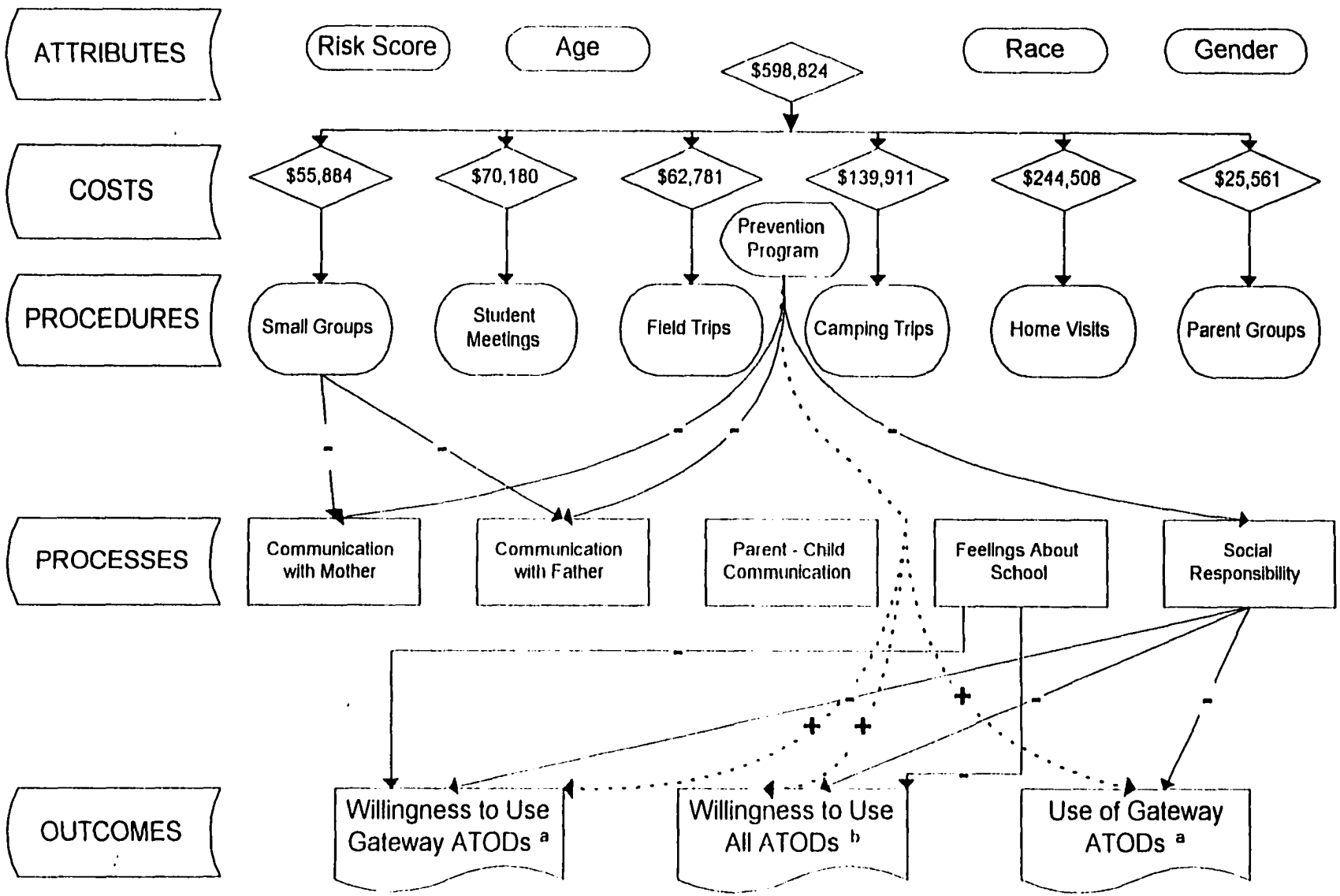
In this study we investigated the question of what is the most effective and affordable way to prevent substance abuse in adolescents. To answer this question, we studied the relationships between costs expended, procedures implemented, processes affected, and outcomes achieved for the C.A.R.E Project. While the overall findings did not support the effectiveness of Project C.A.R.E. in preventing ATOD use, we did uncover meaningful evidence of movement in the right direction. That is, processes were identified that led to the desired outcomes of reducing ATOD use and willingness to use. Further, findings of no-impact or a negative impact provide important data regarding what does not work to prevent children from using ATOD's. These findings are consistent with the ATOD outcome literature that has reported inconsistent, inefficacious, or iatrogenic results for some prevention programs, including the D.A.R.E. program (Dukes et al., 1995). To improve future program efficacy, these findings are then used to provide suggestions for improving the program by redirecting resources to maximize program impact. Figures 11-14 summarize the study's findings by illustrating the costs, procedure, process and outcome relationships existing at pretest and posttest, as well as change in relationships from pretest to posttest and followup.

Figure 11
Pretest Model: Existing Relationships Between Attributes, Procedures, Processes, and Outcomes



Note: Only significant paths are shown.
Legend:
(+) = Direct relationship.
(-) = Inverse relationship.
a = Gateway ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, and marijuana.
b = All ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, marijuana, and cocaine or crack.

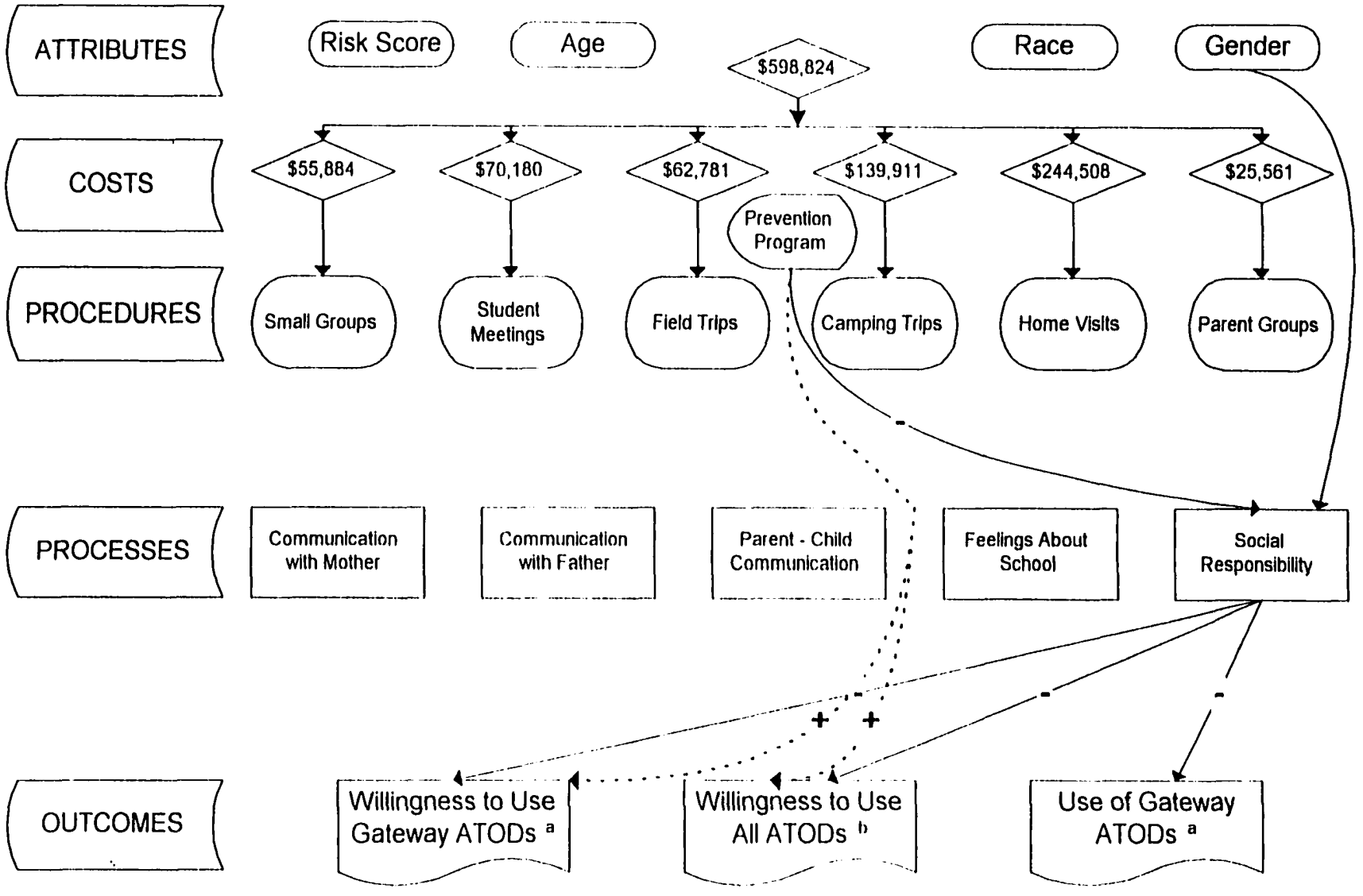
Figure 12
Post-Test Model: Attribute, Cost, Procedure, Process, and Outcome Relationships



Note: Only significant paths are shown.
Legend:

(+) = Direct relationship.
(-) = Inverse relationship.
[a] = Gateway ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, and marijuana.
[b] = All ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, marijuana, and cocaine or crack.

Figure 13
Change (Post-Test Minus Pre-Test) Model: Attribute, Cost, Procedure, Process, and Outcome Relationships



Note: Only significant paths are shown.

Legend:

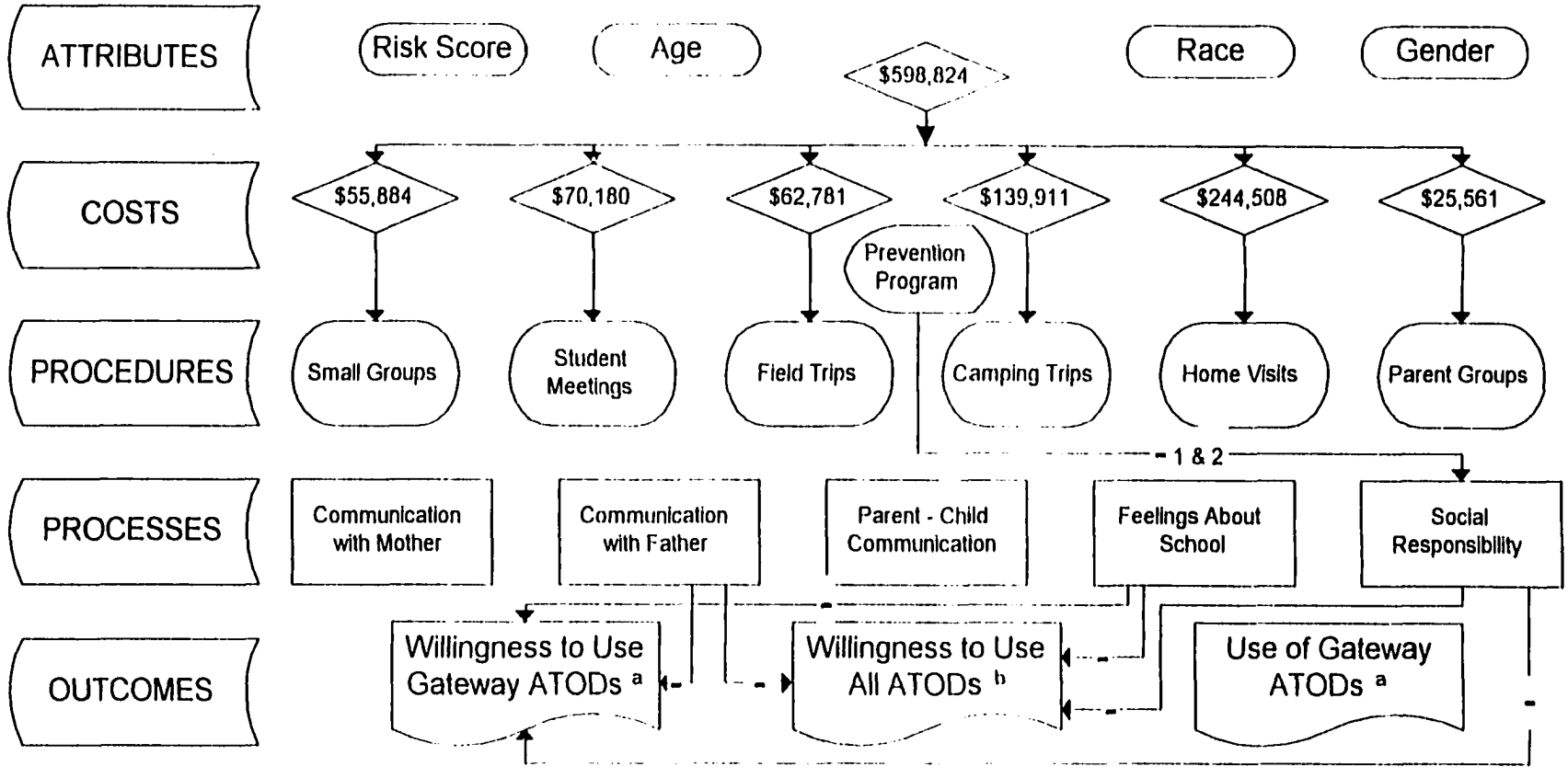
(+) = Direct relationship.

(-) = Inverse relationship.

[a] = Gateway ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, and marijuana.

[b] = All ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, marijuana, and cocaine or crack.

Figure 14
Follow-Up Model: Attribute, Cost, Procedure, Process, and Outcome Relationships



Note: Only significant paths are shown.
Legend:

+ = Findings are for followup #1, except where noted by "1 & 2"
(+) = Direct relationship.
(-) = Inverse relationship.
a = Gateway ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, and marijuana.
b = All ATODs: cigarettes, chewing tobacco, beer, wine or wine coolers, liquor, marijuana, and cocaine or crack.

Program Differences

Participation in the program versus control group was significantly related to ATOD outcomes, with the program group reporting higher levels of ATOD use and willingness to use at posttest than the control group. At posttest, the program group also reported significantly more ATOD outcomes than the lower-risk baseline group. At one and two year followups, the differences between program and control groups were no longer significant. While there was some suggestion that higher family involvement in the program was related to improved ATOD outcomes at the second followup (1 year and 9 months after posttest), this finding was based on a small sample that included only 24% of the program group and was not significant when analyzed with both program and control groups. Further, this sample contained only 71% of those cohort 1 students tested at the second followup and thus this group may be demonstrating a "creaming effect" whereby the most motivated participants remain in the program the longest.

In general, while the program may have temporarily increased youth's experimentation and relaxed their attitudes towards ATODs, this detrimental effect appears to have been short-term. Moreover, no "dose-response" relationship was observed whereby outcomes would have been augmented by increased participation in the program group. This finding suggests that the biggest difference may have been between the program and control populations rather than attributable to amounts of the program received. Despite this lack of differences, it is important to investigate the overall ineffectiveness and temporary iatrogenic effects of Project C.A.R.E. These negative or inefficacious results may be due to the selection of program procedures that did not influence critical processes, or influenced these processes in a negative way.

Participation in the program was also related to lower levels of Social Responsibility and child Communication With Mother and Father at posttest. As with the

ATOD outcomes, the program had no significant effect on these processes at followup testing. It is unlikely that these findings can be explained in terms of the "sleeper effect of prevention (Green, 1977)." That is, in light of the program group's actual decrease in key processes and increase in ATOD use at posttest relative to the control group, there is minimal likelihood that the positive effects of prevention would become apparent at extended followup.

The only individual program procedures that were significantly related to processes were home visits and student groups. However, the apparent relationship between increased involvement of fathers in home visits and increased Social Responsibility appeared to be due to the gender of the child. The tentative father involvement effect may also have been due to correlative, rather than causal, factors such as the higher socioeconomic status associated with two-parent families. The gender difference in Social Responsibility will be discussed in detail in the following section.

In contrast, increased participation in student small groups was related to decreased Social Responsibility and Communication with Parents from pretest to posttest. The small groups consisted of educational groups of 4-8 children who met weekly for learning life skills and related ATOD prevention skills. A possible explanation for the negative effects of the small groups is that participation in groups of same age peers, who are all considered "high risk" youth and many of whom have already experimented with ATODs, may constitute a negative peer group and may, in fact, increase peer pressure and likelihood of engaging in negative behaviors. Association with deviant peers has consistently been found to be among the strongest predictors of ATOD use among youth (Barrett, Simpson, & Lehman, 1988, Jessor & Jessor, 1984, and Kandel, 1985).

The student group strategy may have also contributed to the decrease in child communication with both mother and father apparent at posttest. The link between the program group and child communication with parents was not present at pretest and may

have been created as a result of the increased peer interactions in the program. While the developmental drop in communication with parents was to be expected, the program group dropped at a rate significantly greater than that of the control group. This finding leads us to posit that the particularly high risk constitution of the program group may have led youth to more quickly and/or more fully turn to peers and away from parents. Thus, while peer groups are often used as a context in which to teach youth life skills, this educational strategy may fail when the interaction in the group is with other deviant peers who have used or are at high risk for using ATODs. This finding is worthy of future research to determine at what age, gender, and race this effect may occur. Alternatively, the discussion of ATODs, with lesson plans such as "Becoming Informed about Drugs", may have peeked youth's interest and increased their experimentation with ATODs.

The high correlations between mother participation in home visits and student participation in both the small groups and individual meetings suggests that greater participation in the program may reflect greater need on the part of the participants. There was some flexibility in the program design such that individuals in crisis could receive more home visits and program staff could schedule more individual meetings with students more in need of help. While this flexibility may best meet the needs of the participants, it also constitutes a form of self-selection in that clients can self-select the dose of the program they receive. In this way, the increased participation in the program appears ineffective or even harmful because the most frequent participants are those who are the most at-risk. However, even if this self-selection occurred, there is the possibility that the participants were selecting an injurious procedure. Regardless of the exact nature of the problem, it is clear that conducting drug education with youth is a delicate matter that should be approached with considerable prudence.

Cost-Effectiveness

It is difficult to talk about "cost-effectiveness" when the term implies an improvement in the behavior studied. As Project C.A.R.E. did not produce a reduction in ATOD use, and in the short term actually worsened ATOD outcomes relative to the control group, the program was clearly not cost-effective. Despite these findings, we can discuss the relative costs and participation in the program procedures.

Findings from the cost analysis indicated that student small groups were one of the least expensive procedures, accounting for only nine percent of total program cost. As expected, group meetings require fewer personnel per client and thus have lower personnel expenditures. Additionally, procedures held in the school, such as the student small group meetings, had the highest attendance levels. This is likely because the youth are a captive audience in school. Student small group meetings had the lowest estimated cost per participation episode because of the large number of youth in attendance. While student small group meetings was the least expensive program procedure, it should also be remembered that it was the most injurious of the critical process of Social Responsibility.

Mediating Variables

With the exception of the Communication with Father variable, all of the other process variables were significantly related to ATOD outcomes. At pretest, better Communication with Mother was related to less willingness to use gateway and all ATODs. Higher pretest levels of Parent-Child Communication, Feelings about School, and Social Responsibility were also related to less actual Use of Gateway ATODs. At posttest, higher ratings for Feelings about School were correlated with less willingness to use gateway and all ATODs and higher ratings for Social Responsibility were related to both less willingness and less actual ATOD use. The relationships found between the

bonding variables (i.e., family, school, and societal) and ATOD outcomes support the use of the social development model as an ATOD abuse prevention framework.

Although the above findings suggest a relationship between family and school bonding and ATOD outcomes, actual change seems to occur exclusively through the social bonding process. While a single definition of the concept of Social Responsibility is difficult to determine, these items tap into a predilection for justice and a concern for other people's welfare. Increases in Social Responsibility from pretest to posttest were related to decreases in Use and Willingness to Use Gateway ATODs from pretest to posttest. The linear relationship evidenced between Social Responsibility and the outcome variables cannot be explained by overlap in the measures. That is, there is no similarity in terms of items or item content between the two scales. Thus, Social Responsibility appears to be a key link in the CPPO model of prevention of ATOD use, and one that is malleable.

While participation in student small group meetings was inversely related to Social Responsibility, no direct relationship was found between the small groups and ATOD outcomes. The lack of significant relationships between this procedure and ATOD outcomes advises caution when drawing conclusions regarding paths from procedures to processes to outcomes.

Gender Differences

A strong gender effect was observed whereby girls started at higher levels of Social Responsibility than boys, but significantly worsened over time. At posttest, there were no significant differences between boys and girls in reported levels of Social Responsibility. When the effect of father's involvement in home visits was removed, the interaction between gender and time for Social Responsibility remains significant. These findings make gender an important consideration in the implementation of a program designed to impact Social Responsibility. The results of the present study are consistent

with previous research that has found sex differences in a variety of justice-related behaviors, including Social Responsibility (Witt, 1990). Keith et al. (1990) found a significant main effect for gender, with girls more likely to participate in volunteer activities than boys.

More research is needed, however, on the reason for the drop in the girls' Social Responsibility over time. The girls may have been "ready" to be influenced by their peers or experience a developmentally appropriate decline in social responsibility and/or a ceiling effect may have taken effect whereby girls fell from their previously high levels of social responsibility. The possibility also exists that the girls' decrease in Social Responsibility was actually the result of the social *desirability* of being less socially responsible. If this were the case, it would still be important to address the changed attitudes toward social responsibility. Although no significant group by gender differences were found, the particularly rapid decline of the program girls in Social Responsibility from pretest to posttest points to a program's need to tailor its interventions to maintain or increase levels of Social Responsibility in girls of this pre-adolescent age group.

The findings regarding girls' rapid decline in Social Responsibility are particularly worrisome in light of the apparent link between Social Responsibility and ATOD attitudes and use. The National Center on Addiction and Substance Abuse at Columbia University (1996) has recently reported that there is no longer a gender gap among adolescents in their use of ATODs. However, women are more vulnerable to the short and long-term consequences of ATOD abuse than men, including addiction, ATOD use during pregnancy, development of disease, and becoming victims of violent crimes. Because of the profound impact of increased ATOD use on females, prevention programs must also be designed to account for gender differences in ATOD - related attitudes and behaviors.

Limitations of the Present Study

Several factors need to be kept in mind when evaluating the present study. A primary consideration is that assignment to groups may not have been as random as intended. Both the procedure used to select youth for the program and the method used to elicit parental consent may have contributed to the apparent lack of randomness in the group assignment. Additionally, as discussed earlier, the possible self-selection out of program conditions may have undermined the randomness of assignment. This speaks to the need for truly random assignment both before and during program implementation (Heinsman & Shadish, 1996).

The method used to assess risk may have inadvertently produced disparate score groups. While youth had to meet a minimum of two criteria to be "high risk," there is the possibility that students with similar scores had highly different levels of ATOD use. For example, a child who met two of the criteria as a result of mental health problems and being economically disadvantaged may have been quite different in terms of ATOD use behaviors from a child with a similar score that was based on having parents who used drugs and had positive attitudes toward drug use as well as having a family with a history of alcoholism. Because similar score groups can have different meanings, there is the possibility that students whose scores reflected more severe ATOD use behaviors were assigned to the program group.

Another limitation of the study is that the procedure used to select youth for the program was open to partiality in that risk assessment ratings were used to assign youth to program and control groups, starting with the highest risk score and assigning alternate numbers to program and control groups. Teachers completed a risk assessment for each child in their classes in which they rated youth on a variety of variables, including suspected youth and family ATOD involvement and future risk for dropping out of school.

Objective and archival measures (e.g., attendance) would have reduced the subjectivity involved in the measure of at-riskness.

The assignment procedure, whereby a child was automatically assigned to the program group if that child's family had previously participated in the program, may have also produced an unintended bias. While this assignment procedure prevents contamination of results within families, it also allows for the possibility that children from families with more children were assigned to the program group. This possibility merits concern because research has linked large family size with important variables, such as low socioeconomic status and academic achievement (Downey, 1995; Hanushek, 1992;). However, it should be noted that this effect reportedly only affected a small percentage of cases and thus by itself cannot account for the apparent non-random assignment.

A related limitation of the study is that the program and control groups were not matched on key variables of interest. This limitation is significant in that different distributions in race may have contributed to the apparent lack of program effectiveness in preventing ATOD use. In particular, the control group had ten percent more Hispanic youth (37%) than the program group (27%). Among the three racial groups represented in the program, Hispanic parents reported the highest levels of communication with their children from pretest to posttest. Because Parent-Child Communication was linked to gateway ATOD use at pretest, there is some suggestion that this variable may play a role in mediating ATOD behaviors. Further, the different racial composition of program and control groups suggests that race may have been a criterion in selecting youth for the program. Matching by race or using a more objective system for rating youth at high risk may have reduced some of these discrepancies.

The consent procedure used was also problematic in that the evaluator first randomly assigned students to the program or control group, and then their participation in the selected group was solicited. This procedure allows for a possible volunteer

confound, as those who agree to participate in the program group may be more likely to improve. However, this threat is minimized by the presence of the same volunteer requirement across program and control groups. This consent procedure also poses a threat because the participants knew what condition they were agreeing to and there is the possibility that they would not have agreed to the alternative condition. The rationale behind the decision to obtain consent subsequent to assignment was that families would be less likely to agree to have their child placed in an unknown condition and that such a procedure could generate a lack of understanding and mistrust among high risk families.

While this consent procedure was predicted to result in a "healthier" program group, the actual program group youth started at higher risk and lower levels of Social Responsibility than the control group youth, according to teacher rated risk assessments and child self-reports of Social Responsibility. These higher risk youth may have been less amenable to modification or stabilization of their levels of ATOD use and willingness to use. Further, it may be necessary to tailor the interventions to this higher risk group. Program procedures that work for lower risk youth may not be appropriate for those youth considered at high risk. Moreover, interventions designed for primary prevention may backfire if the youth are experienced enough with drugs that secondary prevention is indicated. This may have been the case for this prevention program in that at pretest, 6% of youth reported having used cigarettes at least once in their lifetime, 10% reported prior use of wine or wine coolers, and 17% reported prior use of beer.

An additional limitation of the present study is its reliance on self-report data that may be subject to a social desirability bias. While the use of self-report measures raises questions about the validity of reported ATOD use, previous studies that have compared self-reports of ATOD use to biochemical and other external sources of information have concluded that self-report measures provide valid and reliable estimates of youth's ATOD use (Snow et al., 1992). If any bias does exist, there is some evidence that it may work

against the program group. Rather than giving socially desirable responses, program participants may be more honest at posttest because they developed relationships with program staff and were willing to report honestly. Whereas, control youth, having not developed such relationships, may be more likely to provide socially desirable responses (Hostetler, 1992).

Several considerations need to be kept in mind when reviewing the cost analysis. First, the cost analysis uses data from the first through third cohorts of the program (1990-1992) and does not include data from the pilot project. The omission of the pilot project data from the analysis may result in an underestimation of program costs if the pilot project mitigated the impact of start-up costs on the first cohort. In-kind contributions represent another area of potential devaluation of program costs. While in-kind contributions are not included in the cost analysis due to a lack of information necessary to estimate their monetary value, these items should be considered additional resources necessary to implement the program. In-kind donations included office space, telephones, clerical support, and oversight responsibilities provided by the school district; camp scholarships provided by the YMCA; and meeting space for parent group meetings provided by a local church. Further, estimates of personnel time per procedure necessarily underestimate actual time spent as they include only the actual procedure time and not travel time, which in the case of procedures such as home visits, may be considerable. Finally, it is important to note that the cost estimates in Table 4 include approximately eight percent of resources allocated for program evaluation. It should be noted that procedure and client costs would be lower without the research component of the grant.

Recommendations and Directions for Future Research

When reviewing the cost-outcome findings from the program overall, it is possible to provide several recommendations for revision of Project C.A.R.E. First, the program

should eliminate the potentially iatrogenic student group meetings. To the degree that other procedures replicate the peer environment of the student group meetings, these procedures should also be eliminated or modified. While the current program considered the theoretical importance for including both child and parent intervention components, the program did not provide any theoretical support for their decision to select the peer group procedure. Future programs should select program procedures based on current outcome literature. Second, other procedures should be considered that take advantage of the relationship between Social Responsibility and ATOD outcomes, while addressing possible interactions with gender. Caution should be taken as there may be hidden processes that were not uncovered by this analysis and/or the relationships between variables may be more complex than we have illustrated. Finally, other promising procedures should be evaluated for use or enhancement in the new program design.

The revised program could then be studied to determine if the relationships between program procedures, processes, and outcomes were still present. A second version of the program including only home visits involving fathers could be compared to the revised version to determine if additional procedures perform a supporting function in allowing the home visits to be effective. A third program could also be developed that uses additional procedures designed to foster processes such as Social Responsibility that are significantly related to ATOD outcomes. The cost implications of the various program models should be considered. Further, such efforts should be taken on as small-scale pilot studies so that program effectiveness is determined before a large amount of resources are consumed. These efforts would enable the program to successively determine the combinations and sequences of procedures that yield the most cost-effective solution to the problem of preventing youth substance abuse.

Longitudinal studies are also needed to clarify the relationship between risk factors and future drug abuse. The current research on risk factors and ATOD use is primarily

correlational in nature and the approximate percentage of identified high-risk youth who in later life will become substance abusing individuals is unknown. If we could determine the percentage of youth who will become substance abusers, we could estimate the cost savings associated with a particular substance abuse prevention program.

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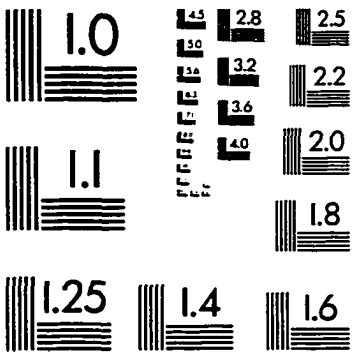
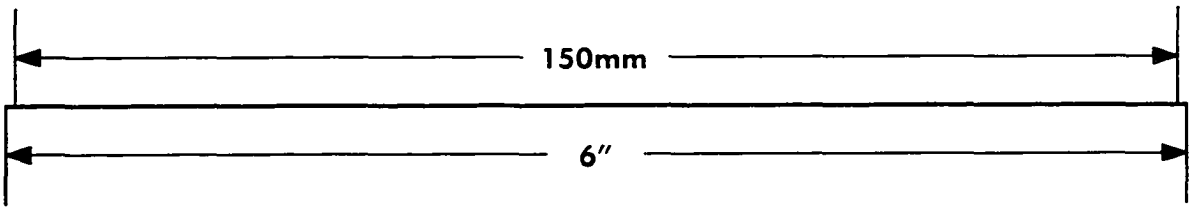
IMAGE EVALUATION TEST TARGET (QA-3)





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