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Correlates of Seat-Belt Use by Adolescents: Implications for Health Promotion[1]

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This study examined the psychosocial and behavioral correlates of seat-belt use among 1,728 10th-graders in four Northern California high schools. Parent and friend seat-belt use patterns were most highly correlated with student seat-belt use ($r = 0.66$ and $r = 0.61$, respectively) and together accounted for 46% of the variation in use. These relationships held across differences in sex, ethnicity, and socioeconomic status. Failure to wear seat belts was associated with a higher use of alcohol, cigarettes, marijuana, and cocaine; more tolerance toward speeding and drinking while driving; less exercise; and more preference for fat in the diet. Our findings attest to the power of parent and peer influences in shaping seat-belt use by adolescents and suggest that not wearing seat belts can be conceptualized as one facet of a pattern of general risk-taking behavior. These findings suggest several possible educational interventions to increase seat-belt use by adolescents.

INTRODUCTION

Automobile accidents are the single leading cause of death and serious injury in children and young adults in the United States (1, 2). Half of traffic fatalities could be prevented if automobile drivers and occupants wore seat belts (1, 2, 12). Although 15- to 24-year-olds constitute only about one-third of the population, they account for more than half of all fatalities from motor vehicle accidents (10). One of every 100 15-year-old boys will die in a motor vehicle crash before reaching age 25 (13). In addition to saving thousands of young lives, wearing seat belts would save several billion dollars each year in insurance, legal, medical, lost production, and human capital costs (4). Identifying factors associated with low usage may aid in the development of educational programs designed to increase use of seat belts by adolescents.

This study was designed to answer two questions: (a) What are the determinants of seat-belt use by adolescents? (b) Is failure to wear seat belts part of a general pattern of risk-taking behavior? Jessor and Jessor's model of problem

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behavior in adolescents (6) served as a framework in the selection of relevant predictor variables. This model asserts that an adolescent's proneness to problem behavior, defined as behavior that is likely to elicit negative sanctions from society, can be accounted for by the interaction of three categories of variables: the personality system, the perceived environment system, and the behavior system. The personality system addresses an adolescent's proneness to engage in problem behavior based on his or her attitudes, values, beliefs, and expectations relative to the behavior in question. The environment system probes for influences from significant others. Last, in the behavior system, the likelihood of engaging in a certain problem behavior is assessed by the adolescent's degree of involvement in other problem behaviors and in conventionally approved behaviors. Together these psychological, social, and behavioral variables have been employed as risk factors to account for problem behavior. The model has been used with adolescents to account for 57 and 31% of the variation in involvement with marijuana (5) and problem drinking (3), respectively. Although failure to wear seat belts is not a problem behavior as defined by Jessor and Jessor (6), it is clearly health compromising. We hypothesized that certain psychological and environmental factors would predict seat-belt use by adolescents and that not wearing seat belts fits into a general pattern of health-compromising behavior.

MATERIALS AND METHODS

Subjects

Tenth-grade students (N = 1,728) in four senior high schools in Santa Clara County, California, participated in a survey designed to detect coronary heart disease risk factor behaviors. The respondents were 52.4% male and 47.6% female. The self-reported ethnic group distribution was 71.1% white, 14.1% Asian, 4.8% Hispanic, 2% black, 1.5% Pacific Islander, 1.2% Native American, and 5.3% other. The mean age was 15 years and, as a result, the majority of students did not have driver's licenses. Father's level of education was as follows: 7% did not complete high school, 19% graduated high school, 17% had some college education, and 57% had college or advanced degrees. Father's level of education served as our index of socioeconomic status (SES).

Although 1,728 students were surveyed, only 1,365 completed the questionnaire items pertaining to seat-belt use. Nonrespondents were 51.7% male, 75% white, 10.6% Asian, 5.4% Hispanic, 2.9% black, 0.6% Pacific Islander, 0.6% Native American, and 4.8% other. Father's level of education in nonrespondents was as follows: 10.7% did not complete high school, 21.3% graduated high school, 15.8% had some college education, and 52.2% had college or advanced degrees.

Procedure

Data were collected over a 5-day period at each school during regular school hours by trained staff led by the project directors. Class sizes generally ranged from 20 to 30 students, and boys and girls were separated. Students completed an 85-page questionnaire assessing self-reported knowledge, attitudes, and behavior

in the areas of physical activity, nutrition, smoking, and stress. Thirteen items assessing attitudes and/or behaviors regarding seat-belt use, speeding, drinking and driving, friends' use of seat belts, and parents' use of seat belts were included at the end of the questionnaire. Test–retest reliability over a 3- to 4-day interval for the accident-related items was 0.86. For the entire survey, a test–retest reliability >0.80 was obtained.

Predictor Variables

Each predictor variable reported is an index, the sum of one or more equally weighted items from the questionnaire. All variables were composed a priori, according to the logic of the risk-taking model, and were patterned after the work of Jessor and Jessor (6). The "personality," "perceived environment," and "behavior" systems developed by Jessor and Jessor correspond to our psychological, social, and behavior systems.

Psychological system variables. Six psychological system variables were assessed: interest in school performance, academic expectations, general health attitudes, attitudes toward speeding, attitudes toward drinking and driving, and seat-belt attitudes. Interest in school performance was assessed by four questions that asked the students how important it was to them to receive academic awards, to do well on tests, and to keep up with and understand coursework. Academic expectations were measured by a single variable that asked how definite the students were about planning to attend college in the future. The general health attitudes variable was based on seven questionnaire items that asked about smoking attitudes, exercise attitudes, and attitudes toward eating red meat and animal fat. Two items targeted speeding attitudes, three targeted drinking and driving attitudes, and four were combined to form the seat-belt attitudes variable.

Social system variables. Six social system variables were assessed: friends' health attitudes, family health habits, friends' health habits, susceptibility to peer pressure, friends' seat-belt use, and parents' seat-belt use. Friends' health attitudes is an index based on eight questionnaire items, four assessing friends' attitudes toward exercise and four assessing friends' attitudes toward healthful diets. Family health habits were measured by two items that asked about general family exercise and dietary habits. Friends' health habits is a variable composed of five items that ask about the regularity with which friends eat "junk food," exercise, smoke cigarettes and marijuana, and drink alcohol. Susceptibility to peer pressure, defined here as students' perception of their likelihood to engage in unhealthful behaviors with their peers (specifically, drinking alcohol and smoking cigarettes and marijuana), was based on three items. Frequencies of friends' and parents' seat-belt use were each based on one item.

Behavior system variables. Three behavior system variables were assessed: school performance, general health behavior, and health-compromising behavior. School performance was assessed by a single self-report of the grades usually earned by the student. General health behavior was based on the students' self-reported frequency of participation in 19 common physical activities and their dietary preference (in each of 16 cases) between pairs of foods of contrasting heart healthfulness. The health-compromising behavior variable was composed of

five items that inquired about the students' frequency of cigarette and marijuana smoking, drinking, use of cocaine, and tendency to break objects when under stress.

Measurement of Seat-Belt Use

Personal seat-belt use. Two questions were used to assess seat-belt use: "Do you wear a seat belt when you ride or drive in a car with friends?" and "Do you wear a seat belt when you ride or drive in a car with your family?" The possible responses for each question were (a) never, (b) seldom, (c) sometimes, (d) usually, and (e) always. Response to the first question was used to report frequency of use broken down by sex, ethnicity, level of father's education, and level of involvement with alcohol and other substances. Responses to both questions were combined to form the index of seat-belt use, which was used in calculating correlation coefficients and in the multiple-regression analysis. The correlation coefficient (Pearson's) between reported use when with friends versus when with family was 0.78.

Friend seat-belt use. Friend seat-belt use was assessed with the following question: "Do your friends wear seat belts when they ride or drive in a car?"

Parent seat-belt use. Parent seat belt use was assessed with the item: "My parents wear seat belts when they ride or drive in a car." The choice of responses for the friend and parent seat-belt use items was the same as for the personal seat-belt use items.

RESULTS

Frequency of Reported Seat-Belt Use

The frequencies of reported seat-belt use when with friends and when with family are presented in Table 1. Students reported a higher use of seat belts when with family members [$X^2(3) = 28.5$, $P < 0.001$]. Reported use also varied by demographic variables (see Table 2). Boys reported more frequent seat-belt use than did girls [$X^2(3) = 17.1$, $P < 0.001$]. Whites and Asians reported greater use than did blacks, Hispanics, and other minorities [$X^2(12) = 65.9$, $P < 0.001$]. The higher the father's level of education, the higher the reported use of seat belts [$X^2(6) = 75.0$, $P < 0.001$].

Correlations between Predictors and Reported Seat-Belt Use

Pearson's correlations of reported seat-belt use with the 15 psychological, so-

TABLE 1
FREQUENCY OF REPORTED SEAT-BELT USE WITH FRIENDS VS WITH FAMILY[a]

	Never (%)	Occasionally[b] (%)	Usually (%)	Always (%)
When with friends (N = 1,353)	13	47	21	19
When with family (N = 1,351)	17	40	18	25

[a] $X^2(3) = 28.5$, $P < 0.001$.
[b] Derived by collapsing the "seldom" and "sometimes" responses together.

TABLE 2
FREQUENCY OF REPORTED SEAT-BELT USE WITH FRIENDS, BY SEX, ETHNIC GROUP, AND FATHER'S EDUCATION[a]

	Never (%)	Occasionally[b] (%)	Usually (%)	Always (%)
Sex[c]				
Boys (N = 712)	12	45	20	23
Girls (N = 641)	14	50	22	14
Ethnic groups[d]				
White (N = 946)	11	46	24	20
Black (N = 26)	46	27	12	15
Asian (N = 199)	10	54	16	20
Hispanic (N = 64)	28	45	17	9
Other[e] (N = 112)	21	51	13	15
Father's education[f]				
High school (N = 328)	22	52	14	12
College (N = 550)	11	49	22	18
Grad school (N = 356)	8	38	26	28

[a] High school refers to those who have had less than or completed a high school education. College refers to those who have had some college or graduated from college. Grad school refers to those who have had some graduate school or completed a graduate degree program.

[b] Derived by collapsing the "seldom" and "sometimes" responses together.

[c] $X^2(3) = 17.1$, $P < 0.001$.

[d] $X^2(12) = 65.9$, $P < 0.001$.

[e] Includes American Indian, Alaskan Native, Pacific Islander, and other ethnic groups.

[f] $X^2(6) = 75.0$, $P < 0.001$.

cial, and behavior system variables are presented in Table 3. Each correlation coefficient was statistically significant ($P < 0.0001$), and in the direction predicted. These correlations were substantiated by nonparametric tests (Kendall's tau). The most highly correlated of all predictor variables were friend seat-belt use and parent seat-belt use, at $r = 0.61$ and $r = 0.66$, respectively. The third most powerful predictor was positive seat-belt attitudes, at $r = 0.35$. These three variables remained strongly and significantly related to seat-belt use when analyzed for boys and girls of different ethnic groups and of different SES. Hence, the strongest predictor variables of reported seat-belt use transcended sex, ethnic, and socioeconomic boundaries.

Stepwise Regression Analysis

A stepwise multiple-regression analysis was performed to determine the extent to which each variable explained the variation in seat-belt use (Table 4). Initially, all of the 15 constructed variables from the psychological, social, and behavior systems were entered into the model. Sex, ethnicity, and SES also were entered. The three demographic variables were forced into the model first. Those predictor variables whose addition did not increase the explained variance of reported seat-belt use were eliminated from the model; those remaining were significant after adjusting for mean differences between sex, ethnicity, and father's

TABLE 3
CORRELATIONS OF THE PSYCHOSOCIAL AND BEHAVIORAL VARIABLES WITH SEAT-BELT USE INDEX

Psychosocial/behavioral variable	Correlation coefficient[a] (Pearson's)
Psychological system	
High interest in school performance	0.15
Against speeding	0.19
Positive general health attitudes	0.22
High academic expectations	0.24
Against drinking and driving	0.29
Positive seat-belt attitudes	0.35
Social system	
Friends with positive health attitudes	0.17
Positive family health habits	0.18
Friends with positive health habits	0.27
Peer pressure susceptibility	−0.29
Friends' seat-belt use	0.61
Parents' seat-belt use	0.66
Behavior system	
Positive general health behavior	0.15
School performance	0.22
Health-compromising behavior	−0.24

[a] $P < 0.0001$ for all correlation coefficients.

education. All demographic variables combined accounted for less than 10% of the variance. In contrast, parent seat-belt use and friend seat-belt use were much more powerful predictors, accounting for an additional 46% of the variance. Seat-belt attitudes and susceptibility to peer pressure accounted for an additional 4% of the variance.

Health-Promoting Behavior, Health-Compromising Behavior, and Seat-Belt Use

Table 5 presents the correlations between our index of seat-belt use and health-related behaviors. Those students who reported less physical activity and pre-

TABLE 4
STEPWISE MULTIPLE REGRESSION OF DEMOGRAPHIC, PSYCHOSOCIAL, AND BEHAVIORAL VARIABLES AS PREDICTORS OF SEAT-BELT USE

Predictor variable	Regression coefficient (unstandardized)	Multiple R^2 (at each step)
Sex, ethnicity, and father's education		0.09
Parent seat-belt use	0.78*	0.44
Friend seat-belt use	0.81*	0.55
Positive seat-belt attitudes	0.12*	0.58
Peer pressure susceptibility	0.10*	0.59

* $P < 0.0001$.

TABLE 5
CORRELATIONS OF HEALTH-RELATED BEHAVIORS WITH SEAT-BELT USE INDEX

Behavioral variable	Correlation coefficient[a] (Pearson's)
Level of physical activity	0.15
Preference for heart-healthy food	0.16
Frequency of cigarette smoking	−0.24
Frequency of marijuana use	−0.24
Frequency of drunkenness	−0.16
Frequency of cocaine use	−0.15

[a] $P < 0.0001$ for all correlation coefficients.

ferred less heart-healthful foods were less likely to wear seat belts. Those who reported more substance use also reported using seat belts less.

DISCUSSION

This study was designed to identify correlates of seat-belt use by adolescents and to determine the relationship between nonuse and other unhealthful behaviors. We found that parent seat-belt use and friend seat-belt use were the most powerful predictors of seat-belt use in our sample. In contrast, sex, ethnicity, and SES were weak predictors relative to these social system variables. This study provided support for the hypothesis that failure to wear seat belts does indeed fit into a constellation of risk-taking behavior. Adolescents who use seat belts least report less exercise; more preference for fat in their diets; and more cigarette smoking, marijuana smoking, drunkenness, and cocaine use. Attitudinally, those reporting less use of seat belts report more tolerance toward speeding and toward drinking and driving.

The problem-behavior theory of Jessor and Jessor (6) provided the framework for studying correlates of seat-belt use in the present study. That model has been used to assess an adolescent's proneness to engage in behavior that elicits negative sanctions from society, such as substance abuse. The predictor variables used in our model were created from different items than those used by Jessor and Jessor. However, the system variable groupings used in the study were very similar to those of Jessor and Jessor. Many of our variables differed because we were interested in a different behavior, seat-belt use. Other variables were strikingly similar to those of Jessor and Jessor, because we wished to test the usefulness of their theoretical model when applied to a different form of risk-taking behavior. Our finding that social environmental variables were the strongest correlates of seat-belt use is consistent with previous problem-behavior model studies in the area of substance use (3, 6). We believe our findings expand the problem-behavior model, which was designed to explain socially deviant behavior, to also explain health-compromising behavior.

There are several limitations to this study. The generalizability of our findings

is constrained by the skewed ethnic and SES composition of our study population. Nevertheless, the best predictors of seat-belt use remained equally powerful within ethnic and SES groups when subgroup analyses were performed.

The analyses are based on data obtained from self-reports. The potential for bias is therefore present, since some students may not accurately report their attitudes and behaviors. Validity checks employing behavioral observation of students' seat-belt use were not feasible in this study. However, other investigators have found a statistically significant positive correlation between reported frequency of seat-belt use and actual use measured unobtrusively (9).

The potential for bias may be greatest in reporting tobacco, alcohol, and other drug use, given institutional and parental sanctions associated with substance use among adolescents. However, the prevalence of cigarette, alcohol, and marijuana use reported in our sample is very similar to the prevalence reported in a large survey of drug use among U.S. high school students (7).

Adolescents' seat-belt use may also differ as a function of whether one is seated in the front or the back seat of the automobile. That issue is not addressed in this study, but would be an interesting area for future investigation.

Fifteen-year-olds may be undergoing changes in the way they ride in cars: Some are learning to drive, some of their friends are already driving, and riding with parents will begin to decline in frequency. Adolescents appear to be more likely to engage in risk-taking behavior when they are with friends, which may account for our finding that reported seat-belt use was significantly less when riding with friends versus riding with family. Follow-up surveys are needed to establish the stability of seat-belt use patterns over time. These data are being collected and will be presented in a subsequent report.

It should be noted that 21% of the sample failed to complete the seat-belt portion of the survey. While there were no significant differences between nonrespondents and respondents with respect to ethnicity, father's level of education was significantly lower and reported substance use was significantly higher among nonrespondents. Given the direct relationship among respondents between father's education and seat-belt use, and the inverse relationship between substance use and seat-belt use, it is possible that the self-reported frequency of seat-belt use represents a slight overestimation of use by the entire sample. However, even if this were the case, we would not expect this bias to alter our findings pertaining to the determinants of seat-belt use.

Understanding the pattern of adolescent seat-belt use is an important step in developing programs aimed at reducing mortality from motor vehicle accidents. Our findings point toward several possible levels of accident prevention using educational programs. Our data suggest that seat-belt use by significant others is the strongest predictor of seat-belt use by adolescents. Educational efforts aimed at increasing parental use of seat belts may be useful, sending parents the message that they have a powerful influence over their children's behavior. Another potentially promising approach might be the development of school-based accident prevention programs. Such programs could teach students about the social influences that promote risk taking, providing them with skills to resist social

pressures to engage in risk-taking behavior. Peer-led adolescent smoking prevention programs based on social influence resistance training have provided encouraging results (8, 11).

Since not wearing seat belts clusters with other unhealthful behaviors, educational programs aimed at general health promotion and disease prevention might also enhance the use of seat belts. The adolescents in this study are now taking part in a multiple cardiac risk intervention trial. Half of the students receive an educational program designed to increase healthful behaviors, while half serve as a control group. Accident prevention is not a part of the intervention. We will test the hypothesis that adoption of heart health behaviors will promote changes in other health behaviors by once again measuring seat-belt use following the educational program.

Perhaps the most effective way to increase seat-belt use is to make it mandatory. Legislation regarding mandatory use of seat belts or mandatory provision of cars with passive restraint systems (air bags or automatic seat belts) already exists or is under consideration in several states. Unfortunately, airbags often do not deploy during side impact or minor accidents, and it is estimated that mandatory automatic seat belts will be intentionally disconnected by car owners at a rate of 30 to 40% (1). Consequently, voluntary seat-belt use will likely remain an important health behavior in preventing morbidity and mortality from motor vehicle accidents.

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