

Adolescent Cigarette Smoking: Health-Related Behavior or Normative Transgression?

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Relations among measures of adolescent behavior were examined to determine whether cigarette smoking fits into a structure of problem behaviors—behaviors that involve normative transgression—or a structure of health-related behaviors, or both. In an ethnically and socioeconomically diverse sample of 1782 male and female high school adolescents, four first-order problem behavior latent variables—sexual intercourse experience, alcohol abuse, illicit drug use, and delinquency—were established and together were shown to reflect a second-order latent variable of problem behavior. Four first-order latent variables of health-related behaviors—unhealthy dietary habits, sedentary behavior, unsafe behavior, and poor dental hygiene—were also established and together were shown to reflect a second-order latent variable of health-compromising behavior. The structure of relations among those latent variables was modeled. Cigarette smoking had a significant and substantial loading only on the problem-behavior latent variable; its loading on the health-compromising behavior latent variable was essentially zero. Adolescent cigarette smoking relates strongly and directly to problem behaviors and only indirectly, if at all, to health-compromising behaviors. Interventions to prevent or reduce adolescent smoking should attend more to factors that influence problem behaviors.

KEY WORDS: adolescence; cigarette smoking; problem behavior; health behavior.

Cigarette smoking in adolescence is a prominent public health issue, and concern about its well-established health-compromising consequences has prompted many schools and government agencies to implement programs to prevent the onset of or curb involvement in adolescent smoking. Numerous school-based interventions designed to reduce initiation of adolescent smoking continue to reflect its classification as a health-compromising behavior and its consequences for health and fitness (Hansen & O'Malley, 1996). The emphasis on health consequences of tobacco in the Surgeon General's Report on Preventing Tobacco Use Among Young People

(U.S. Department of Health & Human Services, 1994), the implementation of state laws that mandate education about smoking and health in schools, and even contemporary, school-based prevention programs emphasizing refusal skills and more general life skills training, all call attention to the link between tobacco use and health. Although the latest generation of prevention approaches has eschewed the earlier information deficit model about long-term health hazards, "Providing knowledge of the health consequences of smoking is still an important task for public health. . ." (U.S. Department of Health & Human Services, 1994, p. 217), and at least minimal information concerning long-term health consequences of smoking is still a frequent program component (Botvin, Baker, Dusenbury, Botvin, & Diaz, 1995; Hansen & O'Malley, 1996; Silvia, Thorne, & Tashjian, 1997). Although the need for health-related information seems obvious, there is a real question about how adolescents themselves understand ciga-

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rette smoking, the functions it serves in their lives, and the place it occupies in the larger organization of adolescent risk behavior.

The category of risk behaviors in adolescence encompasses several different subsets of behaviors that can compromise health, well-being, and positive developmental outcomes (Jessor, 1998). One subset includes behaviors, such as alcohol abuse, delinquency, and illicit drug use, that involve transgressions of social and legal norms and that often elicit sanctions from others or the larger society. These have traditionally been referred to as problem behaviors (Jessor, Donovan, & Costa, 1991; Jessor & Jessor, 1977). Another subset of risk behaviors, such as unhealthy dietary habits and insufficient exercise, are those that compromise health, but that do not necessarily violate social or legal norms or result in societal sanctions. We will refer to these as health-compromising behaviors. Although it may be argued that some problem behaviors, such as alcohol abuse, can also compromise health, the key distinction between the two subsets has to do with whether or not the behaviors involve normative transgressions and implicate societal sanctions.

Although both problem and health-compromising behaviors entail risk, there may well be important differences in the subjective meanings or functions the behaviors have for adolescents, and such differences could have important implications for programmatic efforts to change behaviors. The issue with respect to cigarette smoking is whether it is construed as or functions as an element in the health-related behavior structure or in the problem behavior structure, or in both. From a problem-behavior perspective, adolescent cigarette smoking as a normative transgression could be motivated by goals such as rejecting the norms of conventional society, affirming membership in a peer group, asserting independence from parents, or being seen as more mature. Such functions are not necessarily implicated by health-compromising behaviors, such as poor dental hygiene or not wearing a seatbelt. Clues to common functions or meanings underlying different behaviors can emerge from the empirical correlations among them. The main objective of this study is to determine whether adolescent cigarette smoking covaries more with health-related behaviors than it does with problem behaviors, or vice versa, or equally with both.

There are logical as well as empirical grounds for expecting adolescent cigarette smoking to have associations with both problem behaviors and health-compromising behaviors. Like other problem behav-

iors, adolescent cigarette smoking involves a transgression of social and legal norms. And like other health-compromising behaviors, smoking involves actions that have obvious and long-term negative health consequences. Previous research has already shown that cigarette smoking is associated with a variety of adolescent problem behaviors, including alcohol abuse, high-volume drinking, marijuana use, the use of other illicit drugs, delinquency, unprotected sex, and having more sex partners (Biglan *et al.*, 1990; Botvin & Botvin, 1992; Epstein, Botvin, Baker, & Diaz, 1999; Escobedo, Reddy, & DuRant 1997; Farrell, Danish, & Howard, 1992; Hays, Stacy, Alan, & DiMatteo, 1984; Jessor, Donovan, & Widmer, 1980; Neumark-Sztainer *et al.*, 1997; Valois, Kammermann, & Drane, 1997). Indeed, there is recent evidence that a reduction in the initiation of cigarette smoking can result from an intervention in elementary school targeting other problem behaviors (aggressive/disruptive classroom behavior), at least in boys (Kellam & Anthony, 1998). At the same time, there is established evidence that adolescent smoking is associated with various health-compromising behaviors, such as unhealthy diet, unhealthy weight regulation practices, low levels of physical activity, not using seat belts, inadequate hours of sleep, and poor dental hygiene (Burke *et al.*, 1997; Coulson, Eiser, & Eiser, 1997; Donovan, Jessor, & Costa, 1991; Hawkins, 1992; Isralowitz & Trostler, 1996; Pate, Heath, Dowda, & Trost, 1996; Robinson *et al.*, 1987), and that teenagers' attempts to quit smoking are associated with several health-related values and behaviors (Fisher, Stanton, & Lowe, 1999).

At the same time, research has shown that the subsets of problem behaviors and health-related behaviors can be empirically distinguished. Neumark-Sztainer *et al.* (1997) described a health-promoting behavior construct that appeared to be a separate factor from a problem behavior construct. Hays *et al.* (1984) also reported that a cluster of health-enhancing behaviors was empirically distinguishable from a cluster of problem behaviors. Roysamb, Rise, and Kraft (1997) found both general and specific factors underlying substance use and health-related behaviors. Terre, Drabman, and Meydrech (1990) reported multiple dimensions of health-related behaviors, with cigarette smoking contained in only one of those dimensions. In addition, Donovan, Jessor, and Costa (1993) reported analyses yielding separate but inversely correlated latent variables of problem behavior and health-enhancing behavior. The implication of these various studies of adolescent risk be-

havior structures is that, although cigarette smoking relates to both problem behaviors and health-related behaviors, there is some distinctiveness to each domain.

The key concern of the present study is to determine whether adolescent smoking relates more strongly to a structure of problem behaviors or to a structure of health-compromising behaviors, or similarly to both. That determination should have important implications for public health and the design of prevention efforts.

METHOD

Study Design, Procedures, and Participants

The present analyses employed data from the final wave (1992) of a longitudinal questionnaire study of adolescent behavior and development in a large urban area in the Rocky Mountain region. Participants were drawn from six middle schools and four high schools selected by school officials to maximize minority racial/ethnic representation. Letters describing the study and requesting participation were written (in both English and Spanish) to the students and to their parents, and students returned signed consent forms to the school. Confidentiality was safeguarded by a Certificate of Confidentiality from the U.S. Department of Health and Human Services. Study participants were released from class to take part in large-group sessions administered by the researchers. Bilingual versions of the questionnaire were available for those students who preferred to work in Spanish. Annual waves of data were collected from Spring 1989 through Spring 1992. Students received token payments of \$5 for participating in each wave.

Data from Wave 4 provided the most comprehensive set of behavior measures available and the highest prevalence of smoking (48% had tried smoking). The Wave 4 questionnaire was completed by 1782 (74%) of the Wave 1 participants. Fifty-six percent of the Wave 4 participants are female; 38% are Hispanic, 34% are non-Hispanic white, 22% are black, 4% are Asian, and 2% are American Indian. Equal proportions were in 7th, 8th, and 9th grades at Wave 1 (1989). Forty-four percent of the Wave 4 participants are from intact families; 17% have a stepparent living with them (usually stepfather); 33% live with one parent (usually mother) or alternate living with each parent; and 6% live with other relatives or guard-

ians. Further details of the study sample are reported elsewhere (Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995).

To gauge the possible biasing effect of attrition from the original Wave 1 participant sample, we compared those who participated in Wave 4 with those who did not on 12 selected measures of conventional-ity from the Wave 1 questionnaire. Results of the comparison of covariance matrices were presented in an earlier publication (Jessor *et al.*, 1995); they showed that correlations among those measures would have been about the same if no cases had been lost to attrition. The findings reported below, therefore, are not likely to have been biased by sample loss after Wave 1.

Measurement of Cigarette Smoking

Cigarette smoking was assessed by two items. The first item is "Have you ever smoked a cigarette?" Response options were "never," "once," "a few times," and "more than a few times." The second item asked, "During the past month, how many cigarettes have you smoked on an average day?" Seven response categories ranged from "none" to "about two or more packs a day."

Measurement of Problem Behaviors

Four problem behaviors were assessed: early sexual intercourse experience, alcohol abuse, illicit drug use, and delinquency. Sexual intercourse experience was assessed with two items: virgin/nonvirgin status and number of sex partners in the past year. Alcohol abuse in the past 6 months was assessed with three items: frequency of drinking, frequency of drinking five or more drinks on one occasion, and number of times drunk. Illicit drug use was measured by three items: ever used marijuana, frequency of marijuana use in the past 6 months, and number of times other illicit drugs were used in the past 6 months. Delinquency was measured by two two-item scales assessing the frequency in the past 6 months of damaging others' property and of theft.

Measurement of Health-Compromising Behaviors

Four health-compromising behaviors were assessed: unhealthy diet, sedentary behavior, unsafe

behavior, and poor dental hygiene. Unhealthy diet was assessed with two single items and a two-item scale: the two items asked respondents if they pay attention to “eating some fresh vegetables every day,” and “eating healthy snacks like fruit instead of candy”; the two-item scale asked about “keeping down the amount of fat you eat,” and about “eating foods that are baked or broiled rather than fried.” Response options—“a lot,” “some,” or “none”—defined a three-point scale of unhealthy diet. Sedentary behavior was assessed with three items that asked how many hours each week the respondent spends in organized sports, pickup games, and physical activities. Sedentariness was inferred from responses that ranged from “8 or more hours a week” (not sedentary) to “none” (very sedentary). Unsafe behavior was assessed with two items that asked, “When riding with a friend [or with a parent], do you use your seatbelt?” Unsafeness was inferred from responses that ranged from “almost always” to “hardly ever.” Two items were used to assess poor dental hygiene: frequency of brushing (“after every meal” to “every couple of days”) and flossing (“once a day or more” to “almost never”).

Analytic Procedures

To locate cigarette smoking in relation to other behaviors, a model of structural relations was tested for consistency with the data. The first step in this procedure is to establish a measurement model linking the 22 measured indicators described above with nine first-order latent variables (cigarette smoking, four problem behaviors, and four health-compromising behaviors). In the second step, the structural model was tested with paths to the nine first-order latent variables from two second-order latent variables—problem behavior, and health-compromising behavior. Regression coefficients in this model indicate the location of the cigarette smoking latent variable in relation to the other eight behavioral latent variables, and goodness-of-fit measures indicate how well that structural model summarized the data.

On the recommendations of several authors (e.g., Hoyle & Panter, 1995; Hu & Bentler, 1995; Kline, 1998; Marsh, Balla, & Hau 1996), we report multiple measures of fit including chi-square in relation to degrees of freedom (d.f.), goodness-of-fit index (GFI), comparative fit index (CFI), nonnormed fit index (NNFI), and root mean square error of approximation (RMSEA). A good fit of the model to

the data is indicated by a ratio of chi-square to d.f. less than 3, values of GFI, CFI, and NNFI greater than .90, and values of RMSEA .05 or smaller (Kline, 1998). A log transformation was used for each highly positively skewed measure if that transformation did not make the kurtosis very much worse. Severely negatively skewed measures were transformed by squaring them.

Amos version 3.61 (Arbuckle, 1997) was used for the structural equation modeling because it provides a full information maximum likelihood estimate of the covariance matrix that would have obtained from the full sample had there been no missing data. The covariance matrix estimated from all available participants including those with incomplete data ($n = 1782$) was analyzed, as was the covariance matrix computed from those participants who do have complete data for all the measures used in the model (listwise deletion; $n = 1016$, 57% of the 1782 Wave 4 participants). For the findings of principal interest, results are presented from both analyses. The goodness-of-fit measures presented are for the analyses with no missing data, so it is the parameter estimates from those analyses that are displayed in the figures. Although all significance tests rely on critical ratios of unstandardized parameter estimates divided by their standard errors, standardized parameter estimates are shown in the figures so they can easily be compared with one another. The 36 covariances among the 9 latent variables were included in the measurement model; the corresponding correlations are shown in Table 1.

RESULTS

Establishing the Measurement Model

The measurement model relating the 22 measured indicators to 9 latent variables of cigarette smoking, sexual intercourse experience, alcohol abuse, illicit drug use, delinquency, unhealthy diet, sedentary behavior, unsafe behavior, and poor dental hygiene fits the data quite well. Although the chi-square measure of lack of fit, 480.78, is significant, it is less than three times the degrees of freedom (173), indicating a good fit; GFI = .96, CFI = .97, NNFI = .96, and RMSEA = .04. The fit of the measurement model can be enhanced slightly by allowing three of the correlations among residual variances of indicator measures to be nonzero and to be estimated from the data (chi square/d.f. = 1.99, GFI = .97; CFI =

Table 1. Correlations Among First-Order Latent Variables of Cigarette Smoking, Four Problem Behaviors, and Four Health-Compromising Behaviors

Behavior	1	2	3	4	5	6	7	8
1. Cigarette smoking								
2. Sexual intercourse	.35							
3. Alcohol abuse	.55	.51						
4. Illicit drug use	.67	.53	.71					
5. Delinquency	.31	.35	.47	.44				
6. Unhealthy diet	.13	.13	.20	.15	.27			
7. Sedentary behavior	.15	-.08	.03 ^a	.08	.18	.21		
8. Unsafe behavior	.12	.30	.23	.28	.20	.19	.04 ^a	
9. Poor dental hygiene	.08 ^a	.06 ^a	.06 ^a	.08 ^a	.22	.42	.18	.14

Note: $n = 1016$.

^aCritical ratio < 2 ; correlation is not reliably different from zero.

.98, NNFI = .98 and RMSEA = .03). This enhanced model is shown in Fig. 1. Each measured indicator loaded significantly and greater than .50 on the appropriate first-order latent variable, showing that the measured indicators accurately reflect their respective constructs and that the latent variables are reliably assessed. These results constitute a confirmatory factor analysis, confirming nine factors underlying the 22 measured indicators of problem behaviors, health-compromising behaviors, and cigarette smoking.

Bivariate correlations among the nine first-order latent variables (Table 1) provide the first evidence that adolescent smoking relates most strongly to problem behaviors. The latent variable of cigarette smoking is correlated more strongly with the four problem behavior latent variables ($r = .31-.67$) than it is with the four health-compromising behavior latent variables ($r = .08-.15$). It should also be noted that the problem behavior latent variables are more strongly correlated among themselves ($r = .35-.71$) than are the health-compromising latent variables ($r = .04-.42$), even though item variances are comparable between the two sets of measures.

Estimating a Structural Model With Two Second-Order Latent Variables

Step 2 of the analytic procedure involved testing a structural model of the relations of cigarette smoking with the second-order latent variables of problem behavior and health-compromising behavior, allowing cigarette smoking to load on both second-order latent variables, and estimating both loadings from the data (Fig. 2). The model fits the data well: chi-square/d.f. = 2.79; GFI = .95; CFI = .96,

NNFI = .96, and RMSEA = .04. As can be seen, the loading of the latent variable of cigarette smoking on the problem behavior latent variable is large (.71, $p < .001$), whereas its loading on the health-compromising behavior latent variable is not significantly different from zero ($-.02$). In the additional analysis based on the full sample, which corrects for bias due to missing data, those same two loadings are estimated to be .66 and $-.01$, respectively. The parameter estimates indicate that adolescent cigarette smoking is strongly related to problem behavior but has no direct relation to health-compromising behavior. These findings demonstrate that the very modest correlations that cigarette smoking does have with health-compromising behaviors (see Table 1) are actually indirect relations, relations that rest upon the correlation (.35) of the problem behavior latent variable with the health-compromising latent variable (Fig. 2).

Examining Possible Sources of Estimation Bias

Because measured indicators with non-normal distributions can produce biased estimates of coefficients and their standard errors, asymptotically distribution-free (ADF) estimates, which do not require multivariate normality, were obtained in an auxiliary analysis using LISREL (Jöreskog & Sörbom, 1989). Those estimates were essentially similar to the Amos maximum likelihood estimates, except that the ADF estimates of parameters and of their critical ratios were, in general, a little larger, and most measures of goodness of fit were a little better. These results, which are free of bias from non-normality, again show that the relationship of cigarette smoking with problem behavior is strong and significant, whereas with

health-compromising behavior it is close to zero and nonsignificant.

As noted, we used Amos to estimate a covariance matrix based on all 1782 cases, some with incomplete data. This analysis provides estimates of relations among variables, corrected for bias owing to missing data. We compared the parameter estimates to the already reported estimates based on the 1016 cases with complete data. Of the 36 correlations among measured indicators, 27 differed by .03 or less between the

two analyses. Only five differed by more than .05; the largest of those is .07. The average absolute value of the discrepancies is .024. Thus, the correlations among those variables show no systematic bias from missing data. The regression coefficients in the structural model were also approximately the same when estimated from complete and from incomplete data. Therefore, the relationships shown in Figs. 1 and 2 are essentially the same as would have been observed if no cases had been lost owing to missing data.

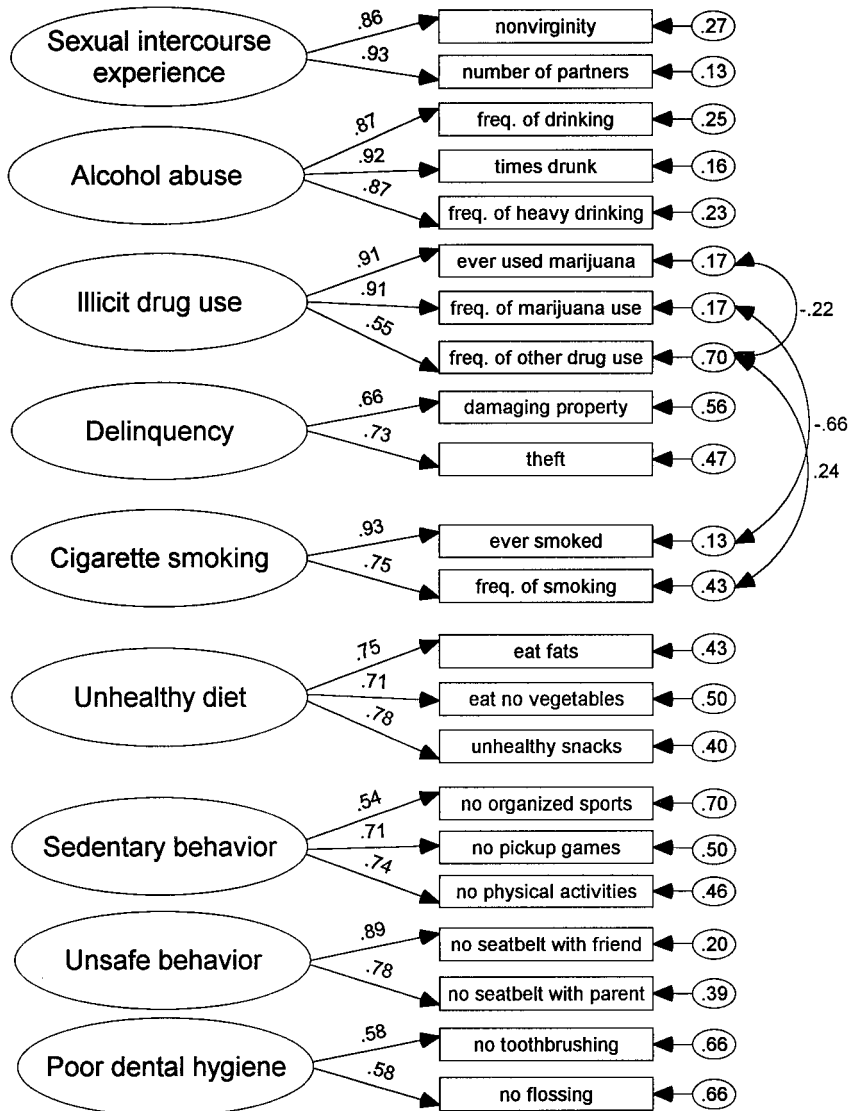


Fig. 1. Measurement model of problem behaviors and health-compromising behaviors. Large ovals are latent variables; rectangles are measured indicators; small ovals are residual variances; curved arrows are correlations; straight arrows are standardized regression weights. All correlations and regression weights are significant ($p < .05$), based on critical ratios of unstandardized parameter estimates.

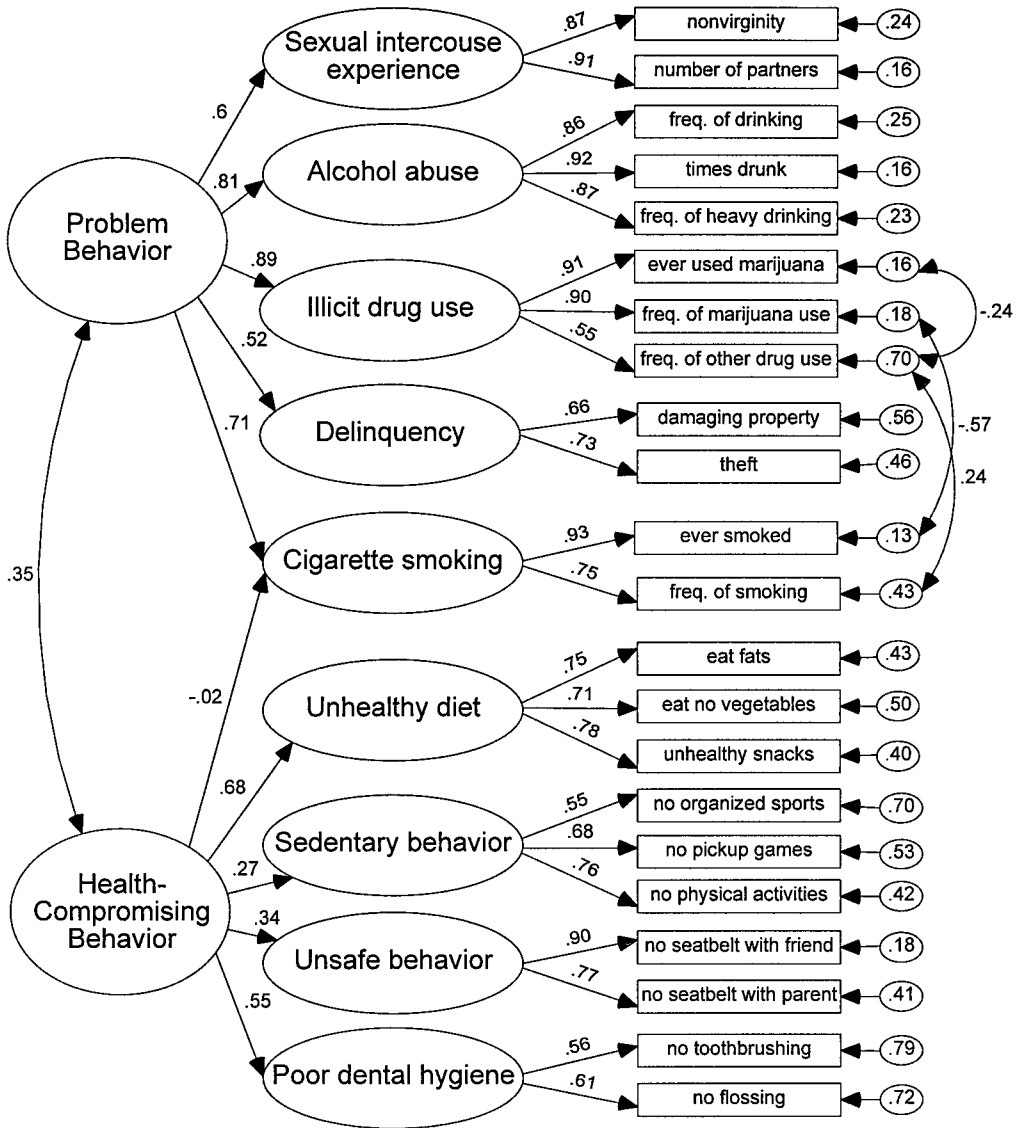


Fig. 2. Cigarette smoking in a structural model of problem behaviors and health-compromising behaviors. Large ovals are latent variables; rectangles are measured indicators; small ovals are residual variances; curved arrows are correlations; straight arrows are standardized regression weights. All correlations and regression weights except $-.02$ are significant ($p < .05$), based on critical ratios of unstandardized parameter estimates.

Estimation of the Structural Model Within Gender and Ethnic Subgroups

The structural model of latent variables was next examined within each gender and within the three largest ethnic groups in the sample, Hispanic, white, and black. In general, the parameter estimates were similar across subgroups in most parts of the model, and goodness-of-fit measures varied very little. The primary differences were found in the variability among coefficients between the

second-order health-compromising behavior latent variable and the first-order latent variables that loaded on that factor. Among females, the loadings were more uniform across behaviors; among males, the loading for unhealthy diet was substantially higher than in the overall sample, while the loading for unsafe behavior was substantially lower. Similar heterogeneity in loadings among the first-order latent variables of health-compromising behaviors was also seen in parameters estimated within each ethnic group.

The factor loading of cigarette smoking on the second-order problem behavior latent variable is quite consistent across genders and ethnic groups (.70–.77), except for a smaller but still substantial loading (.50) among black adolescents. Loadings of the cigarette smoking latent variable on the second-order health-compromising behavior latent variable are not significantly different from zero within any demographic subgroup.

Replicating the Analysis with an Alternative Analytic Method: Regression Analyses

Hierarchical multiple regression affords an alternative way to examine the relations of cigarette smoking with problem behaviors and with health-compromising behaviors. The pattern of relations found in the structural model imply that problem behaviors should share a large portion of variance with cigarette smoking, while health-compromising behaviors should not account for significant variance in smoking after controlling for problem behaviors. Those expectations were confirmed.

A hierarchical multiple regression of cigarette smoking on the four problem behaviors and the four health-compromising behaviors was carried out. The cigarette smoking criterion measure in this analysis is a composite (sum of z scores) of the two smoking measures described above. A similar composite of measured indicators was computed for each of the other eight behaviors represented by the first-order latent variables shown in Fig. 2. To control for socio-demographic effects, measures of gender, ethnic group, grade cohort, socioeconomic status, and intactness of the biological family were entered at the first step in the hierarchical regression. The four problem behavior composite measures were entered next, and at the third step, the four health-compromising behavior composite measures were entered. The change in R^2 at that third step shows how much of the variance in cigarette smoking is shared with those behaviors and not with the problem behaviors. At Step 2, the four composite problem behaviors accounted for an additional 33% of variance in cigarette smoking, $F(4, 1003) = 133.1, p < .001$. At Step 3, the four composite health-compromising behaviors accounted for an additional increment of less than 1% of unique variance, $F(4, 999) = 3.8, p < .01$. If health-compromising behaviors were entered at Step 2, and problem behaviors were entered at Step 3, problem behaviors would account for 30% of unique

variance. These results confirm that adolescent cigarette smoking is closely related to the set of problem behaviors and only minimally related to health-compromising behaviors.

Replicating the Analysis with an Independent Sample: Robustness of the Findings

At the first wave of the longitudinal study (1989), we also collected cross-sectional data from an independent sample of students who were then in grades 10–12 ($n = 1807$) and who were not followed further. This earlier grade 10–12 sample, in which 44% had already tried smoking, was used to cross-validate the measurement model in Fig. 1 and the structural model in Fig. 2. The measurement model, using the 1127 participants with complete data, again fit the data well: chi-square/d.f. = 2.37; GFI = .97; CFI = .98, NNFI = .97, and RMSEA = .03. The structural model fit the data nearly as well: chi-square/d.f. = 3.37; GFI = .95; CFI = .96, NNFI = .95, and RMSEA = .05. The factor loading of cigarette smoking on problem behavior is .80 ($p < .001$), and on health-compromising behavior, it is $-.09$ (not significant). Those loadings, estimated for the full sample ($n = 1807$) from incomplete data, are .78 ($p < .001$) and $-.06$ (not significant).

The hierarchical regression analyses described above were also replicated on this earlier, cross-sectional 1989 high school sample. In this sample, problem behaviors accounted for 34% of variance in cigarette smoking, $F(4, 1028) = 152.5, p < .01$, while health-compromising behaviors accounted for a non-significant increment of 0.4% of unique variance, $F(4, 1024) = 1.9, p > .05$. When the set of problem behaviors was entered after the set of health-compromising behaviors, it accounted for 31% of unique variance.

These results in an independent sample confirm again that adolescent cigarette smoking is closely related to problem behaviors and essentially unrelated to health-compromising behaviors.

DISCUSSION

The present findings suggest that adolescent cigarette smoking can be better conceptualized as a problem behavior involving normative transgression than as a health-compromising behavior. Cigarette smoking in adolescence covaries strongly with a set

of adolescent problem behaviors, and it has little or no direct relationship with the set of adolescent health-related behaviors. These findings suggest that adolescents' decisions regarding smoking entail concerns similar to those involved in other normative transgressions (e.g., peer group membership, autonomy from authority, greater maturity), rather than concerns for health or fitness. The functional organization of behavior in these samples of adolescents encompasses cigarette smoking as just one more behavior in the problem behavior set. In light of this, efforts to prevent or alter adolescent smoking need to attend more to the personal and social determinants—the psychosocial risk and protective factors—that have been shown to influence problem behaviors (e.g., Jessor *et al.*, 1995). A construal of cigarette smoking as largely or solely entailing compromises of health is unlikely to be relevant—and, therefore, unlikely to be effective—for many young people. Indeed, Slovic (1998) argues that young smokers, especially, perceive little risk for themselves, even in the face of widely recognized negative health effects of cigarette smoking. Interventions that do not engage the functions that smoking serves for adolescents are less likely to affect their smoking behavior.

The study has limitations that constrain the inferences that may be drawn. First, although the problem behavior measures consist of multiple-item, well-established scales that have been used in a wide range of previous studies, the measures of health-compromising behavior are less comprehensive and less well developed. In particular, unsafe behavior and dental hygiene could be assessed more comprehensively. However, it is important to emphasize that the variances of the measures in the two sets were very similar. Also, the less-than-desirable initial participation rate of the sample drawn, and the attrition over the subsequent 3 years, deserve mention as potential limitations, even though we were able to show that the resulting bias is probably inconsequential, and that the same results were obtained in an independent replication sample that had not been reduced by longitudinal attrition.

Despite these limitations, the study has shown that relationships of cigarette smoking to problem behaviors and to health-related behaviors differ markedly in each sample, as well as within each demographic subgroup within samples. The findings illuminate the role of normative transgression in adolescent cigarette smoking. The relations of cigarette smoking with problem behaviors are far stronger and direct, while its relations with health behaviors are

minimal and only indirect. Interventions to prevent or reduce adolescent smoking should focus more on psychosocial factors that have been shown to influence adolescent problem behavior.

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