Protective Factors in Adolescent Problem Behavior: Moderator Effects and Developmental Change

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The relation of psychosocial protective factors to involvement in problem behavior—alcohol and drug abuse, delinquency, and sexual precocity—was investigated in a longitudinal study of 7th-, 8th-, and 9th-grade adolescents in a large, urban school district. Protective factors were drawn from the personality, the perceived environment, and the behavior systems of problem-behavior theory. The findings show a significant inverse relation between protection and problem-behavior involvement. There is a significant interaction between protection and risk in the prediction of problem behavior: Protection is shown to moderate the relation of risk to problem behavior. Protective factors are also significant predictors of change in adolescent problem behavior over time. Direct effects of protection are consistent across all gender and racial/ethnic subgroups; moderator effects are evident for female, White, and Hispanic subgroups only.

Research on adolescent involvement in problem behavior, indeed, on adolescent behavior and development more generally, has become more complex in recent years. Multivariate inquiries now map both social and personal influences over time and are displacing single-variable, single-domain, cross-sectional approaches (Jessor, 1993). Increased complexity is also evident in studies that go beyond traditional concerns with demonstrating "main effects" to explore interactive relations among predictor variables as well, and to examine whether those interactions moderate predicted linkages with behavior. The latter kind of complexity is the focus of this article. We report an investigation of the relationships between psychosocial protective factors and involvement in problem behavior in adolescence: alcohol and drug abuse, delinquency, and sexual precocity. The effects of protective factors and their role as moderators of the relationship between risk factors and problem behavior are examined cross-sectionally as well as over time.

Interest in protective factors emerged initially from work in developmental psychopathology. The observation, among children similarly exposed to risk for psychopathology, that many

nevertheless escaped its impact or consequences led Garmezy and others (Garmezy, 1985; Garmezy & Masten, 1986; Rutter, 1987; Werner, 1989a, 1989b) to articulate variables that might be protective, that is, that might serve to moderate, buffer, or insulate against risk. Variation in risk alone had preoccupied previous researchers, but the new attention to protective factors provided a basis for investigators to account for individual differences in outcome in which exposure to risk was essentially held constant. More recently, the possibility of protective factors mitigating the impact of risk has been extended beyond psychopathology to involvement in adolescent drug and alcohol abuse (Brook, Whiteman, Cohen, & Tanaka, 1992; Felix-Ortiz & Newcomb, 1992; Hawkins, Catalano, & Miller, 1992; Stacy, Newcomb, & Bentler, 1992; Stacy, Sussman, Dent, Burton, & Flay, 1992; Wills, Vaccaro, & McNamara, 1992).

Although the concept of risk, borrowed largely from epidemiology, is widely understood, the same is not true for protection. Risk factors are those conditions or variables that are associated with a higher likelihood of negative or undesirable outcomes—morbidity or mortality, in classical usage, or, more recently, behaviors that can compromise health, well-being, or social performance. There has been far less consensus about the concept and operationalization of protective factors. Protection has sometimes been defined simply as the absence of risk or as the low end of a risk variable. Rutter (1987) argued most forcefully, however, that protective factors and risk factors should be treated as conceptually distinct rather than as opposite ends of a single dimension, and that view is now coming to be shared by most others (Felix-Ortiz & Newcomb, 1992; Hawkins et al., 1992; Jessor, 1991; Luthar & Zigler, 1991; Pellegrini, 1990). In this latter perspective, protective factors are considered independent variables that can have their own direct effects on behavior but that, in addition, can moderate the relation between risk factors and behavior.

Protective factors are conceptualized as decreasing the likelihood of engaging in problem behavior: through direct personal or social controls against its occurrence (e.g., strong religious

commitment or predictable parental sanctions); through involvement in activities that tend to be incompatible with or alternatives to problem behavior (e.g., activities with the family or with church groups); and through orientations toward and commitments to conventional institutions (e.g., schools) or to adult society more generally. In contrast, risk factors are conceptualized as increasing the likelihood of engaging in problem behavior: through direct instigation or encouragement (e.g., failure or frustration instigating a coping response, or models and influence from peers); through increased vulnerability for normative transgression (e.g., low self-esteem); and through greater opportunity to engage in problem behavior (e.g., membership in an antisocial peer group).

Research on risk and protective factors has often shown them to be negatively related, but that relationship ought not to be seen as a logical necessity. Rather, it may simply reflect a particular history of personal experience or a particular organization of the social ecology; for example, in those contexts in which protection is high, risk is usually low, and vice versa. These empirical relations notwithstanding, it remains logically possible, for example, to find high risk accompanied by high protection, rather than high risk necessarily implying low protection. An adolescent may well have antisocial friends and yet be committed to and involved in school. Although risk and protection may be inversely related empirically, the conceptual perspective is that they are best treated as orthogonal.

As already noted, the influence of protective factors, whether in relation to substance abuse or to any other adolescent problem behavior, is to lessen the likelihood of its occurrence. When protective factors serve, in addition, as moderators, they modify the relation between risk and problem behavior: That relationship, linear and positive when protection is low or absent, is markedly attenuated when protection is high. This description of a differential relation of risk to problem behavior at different levels of protection is another way of specifying an interaction between risk and protection in their relation to adolescent involvement in problem behavior.

A large number of protective factors, ecological as well as personal, have been explored as moderators of the relationship of risk to behavioral outcomes. Garmezy (1985) organized protection variables into three categories: (a) dispositional attributes, that is, individual differences, such as high self-efficacy; (b) family attributes, such as parental support and affection; and (c) extrafamilial circumstances, such as support from other adults, or strong community integration. In research on alcohol and drug abuse, the protective factors studied have ranged from bonding to conventional society (Hawkins et al., 1992) to supportive relations with parents (Felix-Ortiz & Newcomb, 1992; Wills et al., 1992) to high religiosity and law abidance (Felix-Ortiz & Newcomb, 1992; Stacy, Newcomb, & Bentler, 1992) to self-efficacy in social relations (Stacy, Sussman, et al., 1992).

Our own approach to the delineation of protective factors in adolescence has relied on the systematic implications of problem-behavior theory (Jessor, Donovan, & Costa, 1991; Jessor, Graves, Hanson, & Jessor, 1968; Jessor & Jessor, 1977). In each of the three psychosocial explanatory systems in the theory—the personality system, the perceived environment system, and the behavior system—the variables are specified either as instigators to or controls against involvement in problem behavior.

Instigations are analogous to risk factors, and controls are analogous to protective factors. Although the risk and protective factors used in this study originate from a particular theory, their commonality with the variables used by others, as noted earlier, will be obvious.

Seven protective variables were used in the present research: (a) positive orientation to school, (b) positive orientation to health, and (c) intolerant attitudes toward deviance (and, in later waves, religiosity) from the personality system; (d) positive relations with adults, (e) the perception of strong social controls or sanctions for transgression, and (f) awareness of friends who model conventional behavior, from the perceived environment system; and (g) actual involvement in prosocial behaviors, such as volunteer work and family activities, from the behavior system. Six risk variables were used: (a) low expectations for success, (b) low self-esteem, and (c) a general sense of hopelessness about life, from the personality system; (d) awareness of friends who model involvement in problem behavior and (e) a greater orientation toward friends than toward parents, from the perceived environment system; and (f) poor school achievement (and, in later waves, school dropout), from the behavior system. The measurement of each of these variables and its rationale as a risk or protective factor are elaborated in the Method section.

In research in which multiple risk factors and multiple protective factors have been assessed, there has been growing interest in the amount of risk or the amount of protection as a key parameter, as well as in the various types of risk or protection represented by the specific measures. Findings have shown substantial linear relations between the number of different risk factors and a variety of outcomes (Bry, 1983; Garmezy, 1985; Jessor et al., 1968, Chapter 11; Newcomb, Maddahian, & Bentler, 1986; Sameroff, Seifer, Baldwin, & Baldwin, 1993; Sameroff, Seifer, Barocas, Zax, & Greenspan, 1987; Small & Luster, 1994; Werner, 1989a, 1989b). Rutter (1979) also advocated counting the number of risk (and protective) factors because he found that different risk factors potentiated each other. A counting or cumulative approach to risk and protective factors focuses on variation in the number of different risk or protective factors involved. Exploring this approach is a salient concern of the present investigation, although we also examine the role of particular risk and protective factors.

Unlike earlier research on the moderating role of protective factors, in which the concern was with psychopathology or, more recently, with substance abuse, the focus of the present study is on the larger domain of adolescent problem behavior, including problem drinking, illicit drug use, delinquent behavior, and early sexual intercourse. The aim of the present research is to explore the role of psychosocial protective factors in adolescent problem behavior. Our first concern is to determine whether protective factors are, indeed, associated with lower levels of involvement in problem behavior. Our second concern is to determine whether protective factors moderate the relationship between risk and problem-behavior involvement. And our third concern is to determine whether protective factors are related to change in adolescent problem behavior over subsequent time.

Method

Study Design and Procedure

The data used in this article were collected as part of a longitudinal study of problem behavior and health-related behavior in adolescence.

Begun in the spring of 1989, the study has involved four annual waves of data collection on middle school and high school youths. Participants were in Grades 7 to 9 at Wave 1 when data were collected in six middle schools and four high schools in a large metropolitan school district in the Rocky Mountain region. Participating schools were chosen for the study by the school district administration to maximize representation of Hispanic and Black students from inner-city areas.

Active parental and personal consent was sought for all students enrolled in the selected schools. Letters describing the study were written to the parents and the students, and signed consent forms were returned to the school. All of the letters and consent forms were written in both English and Spanish. Study participants were released from class to take part in large-group administration sessions. Bilingual versions of the questionnaire were available for those students who preferred to work in Spanish. Each student received a token payment of $5 for each wave.

Participants

A total of 2,410 students in Grades 7, 8, and 9 participated in the first wave of the study in 1989. Although participation rates varied from school to school, questionnaires were filled out by 67% of the middle school students (Grades 7 and 8) and by 49% of the high school students (Grade 9). The less-than-desirable initial participation rate was due largely to the necessity of obtaining active parental consent and to the difficulty of eliciting a response from many of the parents. Comparisons of the Wave-1 participants with nonparticipants, using school record data, show that the participant sample did represent the full range of scores on grade point average, standardized achievement test scores, disciplinary actions, and school absences, although participants were, on the average, more conventional than nonparticipants on these indicators.

At the Wave-2 (1990) data collection, questionnaires were completed by 2,016 students, or 84% of the Wave-1 sample. At Wave 3 (1991), 1,974 students (82% of the Wave-1 sample) filled out questionnaires, and, in Wave 4, 1,782 students (74% of the Wave-1 sample) took part. Overall, 1,591 students filled out all four annual questionnaires; they represent 66% of the Wave-1 sample. The effect of the attrition of 819 participants, after Wave 1, was examined. (The non-four-wave participants included participants having only one [n = 212], two [n = 215], or three [n = 392] waves of data.) Their Wave-1 mean scores on 12 selected measures from the questionnaire were compared with the Wave-1 mean scores of the 1,591 four-wave participants on those same measures. The attrition subsample was less conventional or more problem-prone on 9 of the measures, and there was no difference on 3 of the measures. Despite those mean differences, the intercorrelations among the measures were similar in both groups. A test of the equality of the covariance structure matrices in the two groups, based on nine representative variables, yielded a goodness-of-fit index of .997. Although the chi-square of 79.8 was significant ($p < .001$), it was only slightly more than twice the 36 degrees of freedom. Thus, despite the bias toward greater conventionality in the participating four-wave sample, relations among their measures would not be very different had the attrition not occurred.

Forty-three percent of the four-wave longitudinal sample are male, and equal proportions of the sample are in the 7th-, 8th-, and 9th-grade starting cohorts. With respect to race/ethnicity, 36% of the sample are White, 36% Hispanic, 22% Black, 4% Asian, and 2% Native American. Forty-five percent of the participants are from intact families; 22% have a stepparent living with them (usually stepfather); 29% live with one parent (usually mother); and 3% live with other relatives or guardians. The analyses presented in this article were carried out using data from all the White, Hispanic, and Black participants with four complete waves of data (N = 1,486).

Measurement of Risk and Protection

Six measures of risk and 7 measures of protection were obtained from the Wave-1 (1989) data, and they are used as continuous variables in later multivariate analyses of problem behavior involvement. To establish an index of the number of risk factors and protective factors, however, we dichotomized scores on each measure to represent the presence or absence of that risk factor or protective factor using the procedure described later. An overall Risk Factor Index (RFI) and an overall Protective Factor Index (PFI) were then developed on the basis of summative scores that characterized each participant. Dichotomization of scores on each of the individual measures of risk or protection was done so as to yield roughly the extreme 30% of participants on that measure, thus maximizing the likelihood that the risk factor or the protective factor was indeed present. An extreme score on a measure was assigned the value of 1, indicating the presence of risk or of protection on the different measures. A score of 0 indicates no risk or no protection on the respective measures.

Measures of protection. Three protective factors represent the personality system. Positive Orientation To School is a nine-item scale measuring attitudes toward school (e.g., "How do you feel about going to school?") and personal value on academic achievement (α = .79). Having a positive orientation toward school constitutes protection against involvement in problem behavior because it reflects positive engagement with a conventional social institution and commitment to its goals. Such an orientation toward conventionality is not compatible with engaging in behaviors that are considered inappropriate by adults and that may also jeopardize school achievement. Positive Orientation Toward Health is a two-component index based on the standardized score on a 7-item scale of personal value on health (α = .67) added to the standardized score on a 10-item scale of personal beliefs about the health consequences of various behaviors such as smoking and eating junk food (α = .76). A positive orientation toward health constitutes protection because it represents a personal control against involvement in behaviors, such as substance use, that can be damaging to or incompatible with health. Attitudinal Intolerance of Deviance is a 10-item attitude scale assessing the judged "wrongness" of certain delinquent-type behaviors, including physical aggression, theft, and property damage (α = .90). Intolerance of deviance constitutes protection because it reflects a commitment to conventional values and disapproval of norm-violative activities, and it serves as a direct personal control against involvement in such activities. Protection in the personality system is thus indicated by a positive orientation toward school, a positive orientation toward health, and high intolerance of deviance.

Three protective factors represent the perceived environment system. Positive Relations With Adults was measured by four questions assessing a respondent's relationships with parents and other adults, including the extent to which parents show interest in the respondent and whether the respondent is able to discuss personal problems with an adult (α = .61). More positive relations with adults constitute protection because adults provide support for conventional behavior and sanctions against problem behavior. Perceived Regulatory Controls was measured by a two-component index based on the standardized score on a seven-item scale assessing the presence of family rules about getting homework done, dating, curfew, doing chores, and so on (α = .57), added to the score on one question about expected sanctions from friends for involvement in deviant behavior. Perception of greater regulatory controls in the social environment constitutes protection because it increases the likelihood that the adolescent will be deterred from problem behaviors, and it helps make clear the types of behavior that are unacceptable to others. Friends Models for Conventional Behavior, a four-item scale assessing the proportion of friends who are in school clubs, attend religious services, are in community or church youth groups, and get good grades in school (α = .75), constitutes protection because it reflects greater involvement with conventional peers and more time spent in conventional activities. Protection in the perceived social environment is thus indicated by positive relations with adults, high regulatory controls, and high friends models for conventional behavior.

One measure of protection represents the behavior system. Prosocial Activities is a three-item index that combines involvement and time spent in family activities, in volunteer activities, and in school clubs other than sports. High involvement in prosocial activities constitutes protection because prosocial activities preempt time to become involved in problem behavior and also promote orientations and social networks incompatible with the latter.

The operationalization of protection is thus based on answers to the questionnaire that yield characterizations of the respondent, of the social environment as perceived by the respondent, and of the respondent's behavior.

Measures of risk. Three risk factors represent the personality system. Expectations for Success is a two-component index consisting of the standardized score on a four-item scale of expectations for academic achievement (α = .85) added to the standardized score on a nine-item scale of perceived life chances in the opportunity structure (α = .90). Together, these components assess anticipated positive life outcomes in various areas such as school, family life, employment, friendships, finances, and so on. Low expectation of achieving these valued life goals constitutes risk for involvement in problem behavior because it can serve to pressure an adolescent toward alternative means, such as substance use or delinquency, to achieve some of those same goals. Self-Esteem is a six-item scale measuring participants' beliefs about their abilities and attributes in various domains, including social skills, academic competence, and personal attractiveness (α = .66). A low sense of self-worth and low confidence in one's ability to handle challenges and responsibilities constitute risk because engaging in problem behavior can be a way to cope with such negative feelings. Hopelessness is a two-component index consisting of the standardized score on a four-item scale of depression (α = .85) added to the standardized score on a four-item scale of alienation (α = .67). Together, these components assess feelings of depression, anxiety, hopelessness, and social alienation. Disengagement from societal norms and feeling isolated from others constitute risk because the social influences that usually serve as controls against engaging in problem behavior are attenuated, and the sense of vulnerability may lead to coping through problem behavior. Risk in the personality system is thus indicated by low expectations for success, low self-esteem, and high hopelessness.

Two risk factors represent the perceived environment system. Friends Models for Problem Behavior is a four-item scale assessing perceived models among friends for cigarette smoking, alcohol use, marijuana use, and sexual intercourse (α = .75). Exposure to friends who model involvement in problem behavior constitutes risk because models (a) provide an opportunity to learn how to engage in the behavior, (b) offer access to supplies that may be necessary for carrying out the behavior, such as cigarettes, alcohol, or other drugs, and (c) indicate that problem behavior is characteristic of the peer group. The Friend Orientation Index is a two-component measure based on standardized scores on two three-item scales, one measuring perceived agreement or compatibility between parents and friends (α = .71) and the other measuring the relative influence of parents and friends on the respondent's outlook, life choices, and behavior (α = .56). Lower parents–friends agreement and higher friends'-relative-to-parents' influence both indicate greater orientation to friends and constitute risk because parents represent and exercise controls against deviant or norm-violative behavior and generally serve as models for conventional values, attitudes, and activities. Risk in the perceived environment system is thus indicated by high friends models for problem behavior and high orientation to friends relative to parents.

One measure of risk, School Record Grade Point Average, represents the behavior system. Grade point averages in the bottom 28% of the distribution were considered a risk factor. Low school achievement constitutes risk because it may reflect detachment from school, may lower expectations for success in other life areas such as work, may have a

negative impact on self-esteem, and may contribute to a sense of personal hopelessness.

Establishing the RFI and the PFI

The RFI and the PFI were computed by adding the dichotomized scores (0 to 1) on the six risk and the seven protective measures, respectively. Scores on the RFI could range from 0 to 6, and scores on the PFI could range from 0 to 7. For respondents missing scores on measures in an index, the missing values were replaced with the mean of the scores for the relevant gender, cohort, and race/ethnicity subgroup.

The RFI and the PFI are summative indexes rather than scales and, as such, would not be expected to show high alpha reliabilities. The RFI had an alpha reliability of .54; the mean inter-item correlation was .16. The PFI had an alpha reliability of .59; the mean inter-item correlation was .17. Corrected item–total correlations for both indexes ranged from .15 to .41. Given the widely varied content of the indexes, these psychometric properties indicated a reasonable degree of internal coherence for both of them.

The Pearson correlation of −.42 (−.39 for the male and −.46 for the female participants) between the RFI and the PFI was in the expected negative direction. The magnitude of this correlation indicated that the two measures, although empirically related as might be expected, shared only a modest proportion of variance and reflected relatively distinct constructs. The magnitude of this correlation between the measures of risk and protection was, incidentally, quite similar to that found in two other recent studies, namely, −.35 in both Wills et al. (1992) and Felix-Ortiz and Newcomb (1992).

Female students had a slightly higher mean score on the RFI than did male students (1.8 vs. 1.6), $F(1, 1484)$ = 8.0, p < .01, and also on the PFI (2.2 vs. 1.8), $F(1, 1484)$ = 21.7, p < .001. Mean scores on the RFI were highest for Hispanics (2.1), followed by Blacks (1.7) and Whites (1.3), $F(2, 1483)$ = 33.7, p < .001. Mean scores on the PFI were highest for Blacks (2.4), followed by Whites (2.1) and Hispanics (1.8), $F(2, 1483)$ = 15.4, p < .001. Cohort scores on the RFI showed an increase in mean as age increased: 1.5, 1.7, and 2.0 for the 7th, 8th, and 9th graders, respectively, $F(2, 1483)$ = 15.1, p < .001. Mean scores on the PFI decreased, but not significantly, after 7th grade: 2.2, 2.0, and 2.0 for 7th, 8th, and 9th graders, respectively.

Measurement of Problem Behavior

The Multiple Problem Behavior Index (MPBI) assesses four different areas of adolescent problem behavior: (a) problem drinking (score range = 3–24), based on reports of frequency of drunkenness, frequency of high volume drinking (5 or more drinks per occasion), and negative consequences of drinking (α = .81); (b) delinquent-type behavior (score range = 10–50), including self-reports of physical aggression, vandalism, theft, and lying (α = .85); (c) marijuana involvement (score range = 0–8), as reflected in reports of whether the adolescents ever use, frequency of use, availability of marijuana, and the number of times the adolescents have been high (α = .71); and (d) sexual intercourse experience (score range = 1–2), based on respondents' reports of whether they had ever had sexual intercourse.[1] Measures of the four components of

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[1] Mean scores are 4.40 for the problem drinking measure, 16.27 for delinquent-type behavior, 1.68 for marijuana involvement, and 1.22 for sexual intercourse experience. Intercorrelations among these measures are as follows: problem drinking correlates .50, .59, and .34 with delinquent-type behavior, marijuana involvement, and sexual intercourse experience, respectively; delinquent-type behavior correlates .51 and .28 with marijuana involvement and sexual intercourse experience, respectively; and the latter two measures correlate .34. All correlations are significant at p < .001.

the index were transformed into T scores (mean of 50 and standard deviation of 10) and summed.[2]

Male students had a significantly higher MPBI mean score than did female students (202.4 vs. 198.1), $F(1, 1484) = 7.4, p < .01$; mean MPBI score for Hispanics was highest (206.6), followed by Blacks (196.9) and Whites (194.9), $F(1, 1483) = 24.6, p < .001$; and mean scores across cohorts increased from 191.2 to 200.7 to 208.4 for the 7th-, 8th-, and 9th-grade cohorts, respectively, $F(1, 1483) = 42.9, p < .001$. The MPBI has an alpha of .75; it has been well established as an important criterion measure in considerable previous work (Jessor & Jessor, 1977).

Analytic Procedures

Hierarchical multiple regression was used in both cross-sectional and longitudinal analyses to assess, first, whether protection is related to adolescent involvement in problem behavior; second, whether protection moderates the relationship between risk and problem-behavior involvement; and third, whether protection is related to change in adolescent problem-behavior involvement over time.[3]

The demonstration of a moderator effect for protection requires the demonstration of a significant Risk × Protection interaction. Multiple regression provides for the statistical testing of a moderator effect for continuous variables (here the RFI and the PFI) by including their product or interaction term at a later step in the regression equation (Baron & Kenny, 1986; Cohen, 1978; Saunders, 1956). A hierarchical, incremental F test then shows whether the product term, the interaction, adds predictability over and above the account provided by the additive model using just the two predictors.

Results

The Results section is organized into two parts. The first part is based on cross-sectional data from Wave 1 (1989) and examines whether protective factors are related to adolescent involvement in problem behavior and, in addition, whether they moderate the relationship between risk factors and problem-behavior involvement. The second part examines whether antecedent protection is related to change in adolescent involvement in problem behavior over time, using the longitudinal data on later problem-behavior involvement in Waves 2 (1990), 3 (1991), and 4 (1992).

Cross-Sectional Analyses of Protection and Problem Behavior

We ran hierarchical multiple regression analyses to predict the Wave-1 criterion measure of adolescent involvement in problem behavior, the MPBI. A set of five demographic control measures—gender, two ethnic status dummy variables (White vs. Minority; Hispanic vs. Black), family socioeconomic status (SES), and grade in school (cohort)—was entered in Step 1. In Steps 2 and 3, respectively, the RFI and the PFI were entered. Finally, in Step 4, the cross-product, RFI × PFI, was entered as the interaction term. A significant increase in the multiple R^2 following the entry of the interaction term into a regression analysis already containing the RFI and PFI predictors provides evidence for a moderator effect (see Cohen & Cohen, 1983, pp. 320–324). Results of the hierarchical regression analyses are shown in Table 1.

The demographic control measures entered in Step 1 account for a significant portion of the variance in adolescent problem behavior; the R^2 with the MPBI is .10. With the entry of the RFI

Table 1
Cross-Sectional Hierarchical Regression Analysis of the Risk Factor and Protective Factor Indexes With the Multiple Problem Behavior Index: Wave 1 (1989)

Step/Predictor measures	B at final step[a]	R^2	R^2 change
1. Demographic controls		.10***	
Gender	-4.86***		
White or Minority	-1.21*		
Hispanic or Black	2.53**		
Socioeconomic status	-.08		
Cohort	6.56***		
2. Add Risk Factor Index	7.96***	.23***	.132***
3. Add Protective Factor Index	-1.25*	.24***	.013***
4. Add Risk × Protection interaction	-.85**	.25***	.004**

[a] Unstandardized regression coefficients are reported because standardized coefficients are inappropriate with interaction terms (see Aiken & West, 1991, pp. 40–47).
$*p \le .05. \quad **p \le .01. \quad ***p \le .001.$

in Step 2, there is a substantial and significant increment in the amount of variance explained; the R^2 now reaches .23, and the R^2 change of .132 is also highly significant. When the PFI is entered in Step 3, the R^2 increases to .24. The .013 increment is significant and indicates that the PFI accounts for unique variance in the MPBI score in addition to the variance it shares with the RFI, the latter already having been entered. As the unstandardized regression coefficients show, both the RFI (7.96) and the PFI (-1.25) are significantly related to variation in adolescent problem behavior in the direction expected. The data, thus far, provide support for the effect of protection: The higher the number of protective factors, the lower the involvement in problem behavior. The data also support the wealth of previous findings about the effect of risk: The higher the number of risk factors, the greater the involvement in problem behavior.

When the interaction term, RFI × PFI, is added in Step 4, the R^2 change of .004 is also statistically significant. Thus, controlling for sociodemographic factors, and taking into account the effects of the RFI and the PFI, there is still a significant increment in the prediction of problem behavior contributed by the Risk × Protection interaction. This finding provides empirical support for the moderating effect of protection on the relationship between risk and problem behavior in adolescence.

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[2] In the Wave-1 data, eight outlying high scores on the MPBI were recoded to approximately three standard deviations above the mean, thereby ensuring a less skewed distribution for the analyses presented in this article.

[3] Five demographic variables are included in all these analyses as control measures: gender, two indicators of race/ethnicity, an index of socioeconomic status, and cohort. The first ethnicity variable contrasts Whites with Hispanics and Blacks, and the second ethnicity variable contrasts Hispanics with Blacks. The SES index is a three-item measure combining participant's reports of mother's and father's educational attainment and father's occupation ($\alpha = .82$). If any of the components of this measure were missing, the remaining information was used alone. Cohort refers to Wave-1 grade in school: Grade 7, 8, or 9.
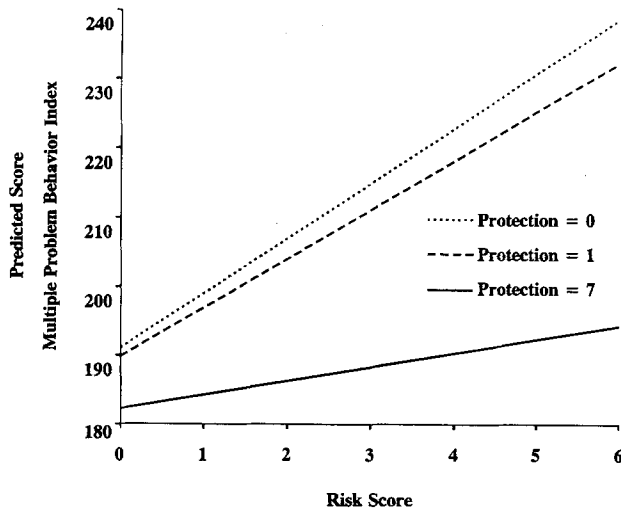
Figure 1. The moderator effect of protection on the relationship of risk to problem behavior: predicted curves.

The significant regression coefficient of $-.85$ for the interaction term indicates that the effect of protection is to lessen the impact of risk more when protection is high than when protection is low or absent.

The moderator effect of protection on the relationship between risk and involvement in problem behavior is illustrated in Figure 1. Using the regression analysis findings reported in Table 1, we plotted the predicted values of the MPBI score, for different levels of protection, against the level of risk. The ordinate in Figure 1 represents the predicted degree of involvement in problem behavior (the predicted MPBI score); the abscissa represents degree of risk (the RFI score); and the three regression lines represent three different levels of protection from highest protection (PFI score = 7) to lowest protection (PFI score = 1) to an absence of protection (PFI score = 0). The interaction effect is evident. When protection is absent (PFI score = 0), increasing the level of risk shows the largest effect, as illustrated by the steep slope of the regression line. At the minimal level of protection (PFI score = 1), the slope of the regression line is slightly less steep. It is when protection is high (PFI score = 7) that it has a pronounced effect: Increasing the level of risk now makes only a modest difference, that is, the slope of the regression line is relatively shallow. High risk is associated with high involvement in problem behavior when protection is absent or low but not when protection is high. In fact, under the condition of highest protection, the predicted MPBI score for high risk is not much higher than the predicted scores for low risk.

The curves in Figure 1 are predicted from the regression equation represented in Table 1; it is also possible to illustrate the moderator role of protection by plotting curves from the actual data. Both the RFI and the PFI were dichotomized as close to the median as possible—at 0 or 1 versus 2 or more— and the significant interaction yielded by a two-way analysis of variance, $F(1, 1482) = 7.3, p < .01$, was plotted in Figure 2. The curves, now based on the four cell means, again illustrate the greater impact of high protection on the risk–problem behavior relation than of low protection.

Replicating the cross-sectional analyses. Parallel cross-sec-

tional hierarchical multiple regressions were carried out for the Wave-2, Wave-3, and Wave-4 data. (In Waves 3 and 4, a new, five-item measure of risk, Dropout Proneness, $\alpha = .86$, was added to the RFI, and a new, four-item measure of protection, Religiosity, $\alpha = .88$, was added to the PFI.) In each of the three subsequent data waves, the total set of predictor measures accounted for a portion of the variance in the MPBI criterion measure similar to that shown in Table 1 for the Wave-1 data: 25%, 26%, and 24%, respectively. In each of the subsequent waves, the demographic controls were significant, but now they accounted for less than 5% of the variance; the RFI and PFI each added a significant increment in variance accounted for; and the RFI × PFI interaction term added a further significant increment in Wave 2 and in Wave 3 (.008, $p < .001$, in each), but not in Wave 4. Thus, the four separate, cross-sectional replications yielded a similar pattern of findings in respect to both the direct and the moderator role of protective factors, except for the nonsignificant interaction in Wave 4. This robustness of outcome obtained although the sample was increasing in age from Wave 1 to Wave 4 and moving from a middle school to a high school context.

Although gender and race/ethnicity were among the demographic controls in all of these analyses, sample size was large enough to permit analyses within gender and race/ethnicity subgroups. Hierarchical multiple regressions were run for male and female students separately, and for White, Hispanic, and Black youths separately, again using the Wave-1 (1989) data. The findings for these subgroups were, with some exceptions, similar to the findings already reported for the total sample.

For female students, the total set of predictors accounted for 29% of the variance in problem behavior involvement; for male students, it was 20%. For both genders, the cohort measure had a significant unstandardized regression coefficient among the demographic controls. For both genders, the RFI and the PFI each added a significant increment to the R^2. And the addition of the RFI × PFI interaction term added a further significant
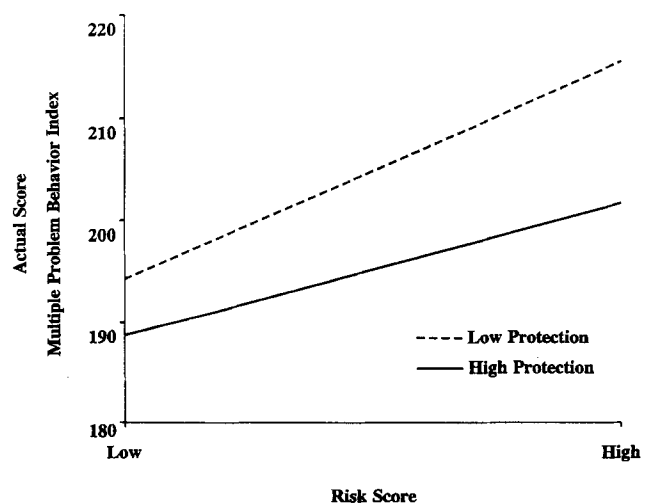

Figure 2. The moderator effect of protection on the relationship of risk to problem behavior: actual curves.

increment (.005, $p < .05$) for the young women, but it did not reach significance for the young men.

When the analyses were carried out for the three race/ethnicity subgroups, the total set of predictors yielded R^2s of .23, .26, and .18 for Whites, Hispanics, and Blacks, respectively (all significant at $p < .001$). Among the demographic controls, cohort had a significant B coefficient for all three subgroups. The addition of the RFI and the PFI each yielded significant increments in R^2 in all groups. And the addition of the RFI × PFI interaction term yielded a further significant increment in R^2 for the Whites (.005, $p < .05$), a near significant increment for Hispanics (.005, $p < .06$), and a nonsignificant increment for Blacks. Overall, the five subgroup replications mimic those shown in Table 1 for the total sample, but the absence of a significant RFI × PFI interaction for male students and for Blacks is an important exception.

Analyzing the components of the MPBI. Although our primary concern in this article is with the higher order construct of problem behavior, measured here by the MPBI, the generality of the present findings can be explored by examining each of the four problem-behavior components of the MPBI as a separate criterion measure. Hierarchical regressions were again carried out, but now separately for problem drinking, marijuana involvement, delinquent-type behavior, and sexual intercourse experience, again using the Wave-1 data. The pattern of findings for each behavior is consonant with that for the MPBI composite index overall: the demographic controls account for between 4% and 12% of the variance in the four problem behavior measures; the RFI and PFI each add a significant increment in variance accounted for (except for the PFI for sexual intercourse experience); and the RFI × PFI interaction term adds a further significant increment in variance accounted for when problem drinking (.003, $p < .05$), marijuana involvement (.004, $p < .01$), and delinquent-type behavior (.005, $p < .01$) are the criterion measures, but not when the criterion measure is sexual intercourse experience. (The sexual intercourse experience measure has the limitation of being a simple dichotomy in these analyses. It should also be mentioned that when the PFI is "unpacked," as in analyses reported later, protection does add a significant increment in variance for this measure.) The total set of predictors yielded R^2s of .16, .21, .21, and .12, respectively, for those four component behaviors, somewhat less than for the composite MPBI, but each a significant R^2 in magnitude.

Thus far, the analyses have shown that counting the number of protective factors yields a measure—the PFI—that is inversely related to adolescent involvement in problem behavior, a finding that is relatively robust over four waves of data, across gender and racial/ethnic subgroups, and across different specific problem behaviors, except for sexual intercourse experience. In addition, the role of protection as moderator of the relation of risk to problem behavior has also received support from the significant RFI × PFI interaction in the total sample analysis and in three out of the five subgroup analyses. Although small, the significant interaction effect is of substantial theoretical importance. We return to the difficulty of detecting interaction effects in field studies, and the usually small magnitudes that are found, in the Discussion.

Analyzing risk and protective factors as continuous measures. The use of cumulative indexes for risk and protection, that is,

counting the number of different risk factors or protective factors, results in treating those factors as equally weighted and, in a sense, as mutually substitutable. Although useful for conceptual purposes, such analyses do obscure the differential importance that particular risk or protective factors may have in regard to adolescent problem-behavior outcomes. To permit an exploration of the differential contribution of the separate measures of risk factors and protective factors, we "unpacked" the Wave-1 RFI and PFI in a series of hierarchical multiple regressions with the MPBI as the criterion. The data are shown in Table 2.

Table 2 presents the bivariate relations between each predictor measure and the criterion, the standardized beta coefficients at the final step, and the R^2 and R^2 change at each step. It is worth pointing out immediately that using the total set of 5 controls plus, now, 13 separate risk and protection measures yields a final R^2 of .48, twice the amount of variance accounted for by the 5 controls plus only the 2 RFI and PFI measures in Table 1. The final R^2 in Table 2 is similar to the level of variance in problem behavior accounted for in much of our earlier work (Jessor, Donovan, & Costa, 1991; Jessor & Jessor, 1977) using a set of about 16 predictor measures from problem-behavior theory. Also apparent in Table 2, both unpacked sets of risk factors and protective factors add a significant increment in the R^2 beyond that of the demographic controls.

At the bivariate level, there is a small negative correlation between SES and involvement in problem behavior, and a small positive correlation between cohort (grade in school or, for the most part, chronological age) and involvement in problem behavior among the demographic measures. Among the risk factors, the strongest bivariate relationship is between the criterion and Friends Models for Problem Behavior, followed by Grade Point Average and Expectations for Success. Among the protective factor measures, the most substantial predictor is Attitudinal Intolerance of Deviance, followed by Positive Orientation to School, Perceived Regulatory Controls, and Friends Models for Conventional Behavior.

The standardized betas in Table 2 mirror the strength of the bivariate relations. Among the demographic controls, the beta for cohort is significant; among the risk factors, Friends Models for Problem Behavior has the largest beta coefficient, with Expectations for Success, Self-Esteem, and Grade Point Average significant but considerably smaller; and, among the protective factor measures, Attitudinal Intolerance of Deviance has the largest beta, with Positive Orientation to School also being significant.

When unpacked multiple regression analyses were run for each of the four adolescent problem behaviors separately, the pattern of findings is quite similar with regard to the relative importance of the different risk and protective factor measures. For all four problem behaviors, the risk factor measure with the consistently largest significant beta weight is Friends Models for Problem Behavior, and the protective factor measure playing that same role is Attitudinal Intolerance of Deviance. Expectations for Success has a significant beta for three of the problem behaviors, Self-Esteem for two, Hopelessness for two, and Grade Point Average for one, among the other risk factors. Among the other protective factor measures, both Positive Orientation to School and Friends Models for Conventional Behavior have significant betas for two of the problem behaviors, and

Table 2

Cross-Sectional Hierarchical Multiple Regression Analysis of the Separate Risk Factor and Protective Factor Measures With the Multiple Problem Behavior Index: Wave 1 (1989)

Step/predictor measures	Pearson r^a	β at final step[b]	R^2	R^2 change
1. Demographic controls			.10***	
Gender	−.07	−.01		
White or minority	−.13	.01		
Hispanic or Black	.14	.03		
Socioeconomic status	−.17	−.02		
Cohort	.23	.05**		
2. Add risk factors			.43***	.328***
Expectations for Success	−.28	−.07**		
Self-Esteem	−.16	.07**		
Hopelessness	.11	.01		
Friends Models, Problem Behavior	.62	.46***		
Friend Orientation	.19	.01		
Grade Point Average	−.32	−.06**		
3. Add protective factors			.48***	.054***
Positive Orientation, School	−.32	−.06*		
Positive Orientation, Health	−.19	.03		
Intolerance of Deviance	−.48	−.26***		
Positive Relations, Adults	−.18	.00		
Perceived Regulatory Controls	−.24	.01		
Friends Models, Conventional Behavior	−.21	−.02		
Prosocial Activities	−.14	.00		

[a] All Pearson correlations are significant at $p \le .01$ or better. [b] Beta values are standardized partial regression coefficients.
* $p \le .05$. ** $p \le .01$. *** $p \le .001$.

Prosocial Activities has a significant beta for one of the behaviors.

At the level of the individual risk and protective factors measures, then, there is a robustness of findings, both across the composite index of problem-behavior involvement and across its components, with respect to the key influence of Friends Models for Problem Behavior and Attitudinal Intolerance of Deviance, and some consistency for several of the other measures in each domain.

Longitudinal Analyses of Protection and Change in Problem Behavior

The four-wave, longitudinal design of the study provides an opportunity to examine whether antecedent protection has implications for change in adolescent involvement in problem behavior with subsequent development. Hierarchical multiple regression analysis was again used, only now with the Wave-1 MPBI score entered at Step 1 as a control, so that the criterion measure was change in the level of involvement in problem behavior in subsequent years, that is, by Wave 2, Wave 3, and Wave 4.[4] The data predicting change in MPBI by Wave 2 (1990), Wave 3 (1991), and Wave 4 (1992) are shown in Table 3. Because the RFI × PFI interaction term was not significant as a predictor in any subsequent year, that step is omitted from the table.

The total amount of variance explained in change in multiple problem behavior involvement declines as the time interval lengthens, from 46% by Wave 2, to 34% by Wave 3, to 28% by Wave 4. As can be seen in Table 3, the Wave-1 MPBI score entered at Step 1 accounts for a substantial amount of variance in the subsequent MPBI scores at Waves 2, 3, and 4. With respect

to change in multiple problem behavior involvement, cohort has a significant beta coefficient in Waves 2 and 4, gender in Waves 3 and 4, and SES in Wave 4 only, when demographic controls are entered at Step 2. When the Wave-1 RFI is entered at Step 3, there is a significant increment in R^2 for all three waves, and the same is true when the Wave-1 PFI is added at Step 4. What is of special interest to note in Table 3 is that the PFI shows a significant beta coefficient in each of the three time intervals, whereas that is not true for the RFI in any of the time intervals.[5]

Despite stability in the MPBI score over time and development, change in multiple problem-behavior involvement does, indeed, show predictability during adolescence. Of the two key theoretical measures, the RFI and the PFI, it is the antecedent number of protective factors that emerges consistently as the significant predictor of change in problem-behavior involvement—the greater the earlier protection, the greater the reduction in MPBI in subsequent years.

Discussion

Psychosocial protective factors appear to play an important role in the etiology and the developmental course of adolescent

[4] The Wave-2, -3, and -4 MPBI measures were constructed similarly to the Wave-1 (1989) MPBI. In each wave, there were eight outlier scores recoded to approximately three standard deviations above the mean. Alpha reliability is .74, .74, and .73 for the Wave-2, -3, and -4 MPBI, respectively. The Pearson correlation of the Wave-1 MPBI with the Wave-2, -3, and -4 MPBI is .67, .57, and .50, respectively.

[5] These analyses were replicated with a three-item MPBI, dropping the sexual experience item because it permits change in only one direc-

Table 3
Longitudinal Hierarchical Multiple Regression Analysis of the Wave-1 (1989) Risk Factor and Protective Factor Indexes With Change in Multiple Problem Behavior by Wave 2 (1990), Wave 3 (1991), and Wave 4 (1992)

Step/predictor measures	Wave 2 (1990)			Wave 3 (1991)			Wave 4 (1992)		
	β at final step[a]	R^2	R^2 change	β at final step[a]	R^2	R^2 change	β at final step[a]	R^2	R^2 change
1. Wave-1 MPBI score		.45***			.32***			.25***	
2. Add demographic controls		.46***	.005*		.33**	.006*		.27***	.016***
Gender	−.01			−.04*			−.08***		
White or minority	.03			.03			.01		
Hispanic or Black	.02			.04			.02		
Socioeconomic status	−.02			.00			.06*		
Cohort	−.04*			−.02			−.08***		
3. Add Wave-1 Risk Factor Index	.04	.46***	.003**	.03	.33***	.003*	.04	.27***	.004**
4. Add Wave-1 Protective Factor Index	−.07**	.46***	.003**	−.08***	.34***	.005***	−.10***	.28***	.007***

Note. MPBI = Multiple Problem Behavior Index.
[a] Standardized regression coefficients, betas, are reported.
* $p \le .05$.   ** $p \le .01$.   *** $p \le .001$.

problem behavior. The present findings argue, therefore, that scientific attention should be broadened beyond its traditional preoccupation with risk factors to encompass variation in protection as well. Protective factors have been shown to relate both directly and indirectly to adolescent involvement in problem behavior—the greater the protection, the less the problem behavior—and, in interaction with risk factors, protective factors can moderate their relation to problem behavior. The overall findings show robustness across four separate waves of data, across gender and race/ethnicity subgroups, and in relation to multiple outcome criteria. The findings also obtain whether an index of the number of risk and protective factors was used or whether the actual continuous measures themselves were used.

The relation of protection to developmental change in adolescence has special significance, given the importance of problem behavior as a characteristic of that life stage. When change in involvement in problem behavior was the criterion— whether over a 1-, 2-, or 3-year interval—it was the PFI that had a significant beta weight at the final step in the regression analysis, not the RFI. What this suggests is that, although risk does have a stronger relation to variation in problem-behavior involvement than protection, antecedent protection has a stronger relation to change (here diminution) in problem behavior than antecedent risk. To the extent this is true, it would have significant implications for intervention efforts seeking to reduce problem-behavior involvement during adolescence.

Although not statistically significant in every analysis, the empirical support for a moderator role for protection—a significant RFI × PFI interaction—was nevertheless substantial; this may well be the most important finding of the study for theory. It corroborates a differential or variable impact of protection on the relation between risk and problem behavior—its major impact being evident when protection is high, and its influence being more

tion. The outcome for all three follow-up waves is essentially identical to the findings for the four-item MPBI used here.

limited when protection is low or absent—a pattern in accord with Rutter's (1987) earlier conceptualization.

The importance we placed on having established a significant Risk × Protection interaction may seem questionable given the small amount of additional or unique variance (about 1%) that is accounted for in most of the analyses. As McClelland and Judd (1993) pointed out, however, "moderator effects are notoriously difficult to detect in nonexperimental field studies" (p. 377) in contrast to the apparent ease with which such effects are found in experiments. A study by Grossman et al. (1992) provides an illustration; they were able to describe "the power of . . . protective factors as independent predictors . . . after risk was taken into account" (p. 546) but then found it necessary to report their "second general finding . . . the absence of any interactions" (p. 547). When interactions are detected in nonexperimental studies, it is the usual case, as in the present study, that they involve only 1% to 3% of the total variance (Chaplin, 1991).

In a telling statistical analysis, and using the present data set as a case study, McClelland and Judd (1993) demonstrated that "jointly extreme observations are crucial for detecting interactions" (p. 382); this is precisely what is achieved by the deliberate assignment of cases in an experiment, but in field studies, the investigator has to work with whatever joint distribution of predictors happens to obtain. Given their argument, the detection of significant interactions in the present study is, indeed, noteworthy. Despite the small magnitude of those interactions, they provide strong support for the theoretical inference sought about the relation between protection and risk, namely, that protection can moderate the influence of risk on problem behavior in adolescence.

In establishing the measures of risk and protection, we followed a strategy that relied on counting the number of different risk factors or protective factors present, emphasizing thereby the amount of risk or protection rather than particular factors or particular patterns of factors. That strategy was clearly useful in revealing both the direct and moderator effects of protection

and, to that extent, showing that magnitude of risk and protection is an important parameter, as others have also shown (Bry, 1983; Sameroff et al., 1987; Small & Luster, 1994). When the RFI and the PFI were unpacked (see Table 2), however, the differential importance of the different risk and protective factors became apparent. Although shared variance affected which measure might achieve a significant beta at the expense of another, it was clear that the most powerful protective factor was a personal control, Attitudinal Intolerance of Deviance, and next was a personal orientation and commitment to a conventional institution, Positive Orientation to School. Among the risk factors, the most powerful one was a measure of instigation in the perceived social environment, Friends Models for Problem Behavior, followed by Low Expectations for Success in regard to conventional goals, and personal vulnerability in terms of Low Self-Esteem and Hopelessness. With respect to both prevention and intervention, these findings suggest targets for program design and practices of family management.

An inquiry that engages both risk and protective factors cannot escape questioning about their separateness as domains of independent variables. The most frequent challenge is that risk and protection are really opposite ends of the same variables, hence highly correlated inversely, rather than being orthogonal. We have dealt with this problem in the introduction by specifying conceptual properties of protective factors that are deliberately different from the conceptual properties of risk factors in relation to problem behavior. Protective factors were conceptualized as variables that reflect involvement with and commitment to conventional society, that control against nonnormative activities, and that refer to activities incompatible with normative transgression. With respect to the actual measures we used to operationalize risk and protection, they seem to us to be rather clear indicators, although one or two may well be arguable. In the end, it is the empirical findings that buttress the case we have tried to make. First, the RFI and PFI share only a modest proportion (18%) of common variance. Second, measures that might most clearly seem opposite ends of a single variable, for example, Friends Models for Problem Behavior and Friends Models for Conventional Behavior, are only correlated −.20, and indeed, in the hierarchical multiple regressions for Delinquent-Type Behavior and also for Marijuana Involvement, both of these two predictor measures retained a significant beta weight at the final step. Thus, it is neither obvious nor useful to assume that being high on one of the measures implies being low on the other.

Third, to pursue this example further, these two measures have quite different correlations with other measures, for example, with Prosocial Activities (.32 for Friends Models for Conventional Behavior and −.11 for Friends Models for Problem Behavior) or with the MPBI itself (−.21 for Friends Models for Conventional Behavior and .62 for Friends Models for Problem Behavior).

Another seemingly obvious example might be the risk factor, Grade Point Average, and the protective factor, Positive Orientation to School. Although related as expected, their correlation is, again, small (.28), and their relations to other measures are quite different. Grade Point Average correlated .36 with SES; by contrast, Positive Orientation to School correlated only .13 with SES. The respective correlations of Grade Point Average

and Positive Orientation to School with Positive Orientation to Health are .14 and .42, with Attitudinal Intolerance of Deviance are .21 and .45, with Positive Relations With Adults are .10 and .30, and with Perceived Regulatory Controls are .14 and .37. The results of the present study seem to us to provide support for the heuristic value of making a conceptual distinction between protection and risk, and for efforts to operationalize that distinction with distinctive measures.

The generality of the findings for the direct effects of protection across both genders and all three racial/ethnic subgroups was pervasive. With respect to the moderator effects of protection, generality was more limited; although evident for the total sample and for the female, White, and Hispanic subgroups, a significant interaction was not found for male students or for Blacks. With respect to gender differences, a somewhat greater proportion of total variance in problem behavior is accounted for among the women than among the men (29% vs. 20%), but no other consistent difference was apparent. With respect to the racial/ethnic differences, the Black sample data accounted for the smallest proportion of variance of any subgroup (18%), and the Black sample was by far the smallest subgroup (n = 346). But it is not obvious why no significant interaction was achieved because there was a direct effect of protection for Blacks, and Blacks also had the highest mean score on the PFI of all three ethnic groups.

The findings we have reported are limited in important ways. The less-than-desirable initial sample participation rate and the subsequent attrition certainly impose limits on the generality of the inferences that can be drawn. The conceptual effort to distinguish risk and protective factors, while salutary, could benefit from further theoretical elaboration, and the empirical support for the distinction, presented earlier, is not immune from alternative interpretation. It is also the case that the measures used, even those about the social environment, are all limited to self-reports from questionnaires, that is, all are provided by the same individual. The possibility, therefore, that common method variance has influenced the findings cannot be ruled out. It would be desirable in future research to have external validity established for the measures used. Measures independent of self-report, especially those for the ecological variables, would clearly be a step forward. Furthermore, the measurement of protection could certainly be made more exhaustive in regard to family, neighborhood, and institutional factors. Finally, deliberate sampling to maximize jointly extreme scores on the risk and protection predictors would permit stronger tests of their interaction.

Despite these limitations, the study has illuminated the role of protective factors in adolescent problem behavior and development. Greater recognition of the direct and moderator effects of protection should provide a strong stimulus for more sophisticated theorizing and, equally important, for the development of prevention and intervention efforts targeted at enhancing protection as well as at reducing risk.

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