Adolescents' and Their Friends' Health-Risk Behavior: Factors That Alter or Add to Peer Influence

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Objective: To examine models of risk for adolescent health-risk behavior, including family dysfunction, social acceptance, and depression as factors that may compound or mitigate the associations between adolescents' and peers' risk behavior.
Methods: Participants were 527 adolescents in grades 9–12. Adolescents reported on their substance use (cigarette and marijuana use, heavy episodic drinking), violent behavior (weapon carrying, physical fighting), suicidality (suicidal ideation and attempts), and the health-risk behavior of their friends.
Results: Adolescents' substance use, violence, and suicidal behavior were related to their friends' substance use, deviance, and suicidal behaviors, respectively. Friends' prosocial behavior was negatively associated with adolescent violence and substance use. Family dysfunction, social acceptance, and depression altered the magnitude of association between peers' and adolescents' risk behavior. In cumulative risk factor models, rates of adolescent health-risk behavior increased twofold with each added risk factor.
Conclusions: Results supported both additive and multiplicative models of risk. Implications for intervention and primary prevention are discussed.

Key words: health-risk behavior; adolescents; peer influences.

For approximately 40 years, adolescent substance use, violent behavior, and suicidality have been included among the priority health-risk behaviors that account for over 70% of illness, disability, and death among adolescents and young adults (USDHHS, 2000). Recent national data on these domains of behavioral health suggest that within a 1-month period, 36.4% of adolescents smoke cigarettes, 33.4% engage in episodic heavy drinking (five or more drinks on one occasion), 26.2% smoke marijuana, and 18.3% carry a weapon; within a 1-year period, 36.6% of adolescents get into a physical fight, 20.5% seriously consider attempting suicide, and 7.7% engage in suicide attempts (CDC, 1998).

Empirical findings have suggested that adolescents' affiliation with friends who engage in risk behavior is a strong predictor of adolescents' own health-risk behavior, at least for substance use and violent behaviors. Investigations have demonstrated that alcohol use by adolescents' friends, for instance, is substantially associated with adolescents' alcohol use (see Hawkins, Catalano, & Miller, 1992, for a review). Similarly, friends' cigarette smoking is related to adolescents' smoking, and friends' use of hard drugs is related to adolescents'

drug use (e.g., Lynskey, Fergusson, & Horwood, 1998). Within the literature on deviant peer group affiliation, similar findings have suggested that friends' delinquent behavior is related to adolescents' aggression and illegal behavior (e.g., Dahlberg, 1998). Moreover, there is some evidence to suggest that friends' risk behavior may be causal; that is, affiliation with risky peers is related to increases in adolescents' risk behavior over time (e.g., Keenan, Loeber, Zhang, Stouthamer-Loeber, & Van Kammen, 1995). This association likely results from a combination of selection effects (i.e., homophily; Kandel, 1978), wherein adolescents choose friends who engage in similar types of behavior, and socialization effects (i.e., social learning theory), wherein adolescents implicitly or explicitly influence one another to engage in these behaviors (Bandura, 1973; Wills & Cleary, 1999).

To extend this social learning theory model, we included two additional areas of potential peer influence in this study: friends' suicidal behavior and prosocial behavior. Although prior research has rarely examined whether friends may be similarly influential toward adolescents' suicidal behaviors, there is good reason to suspect that peers may play an important role in adolescent suicidality. Research on exposure to suicide, and "suicide clusters," for instance, suggests that an individual adolescent's suicidal behavior can lead to a sharp increase in suicidal ideation and attempts among his or her peers (Brent et al., 1993; Robbins & Conroy, 1983), particularly if these peers have preexisting psychopathology. Adolescents whose close friends express suicidal ideation or attempt suicide may be particularly at-risk for suicidal behavior.

Prior research has also infrequently assessed whether friends' prosocial behavior may exert a positive influence on adolescents and perhaps would be related to lower frequencies of adolescents' health-risk behavior. For example, adolescents' affiliation with prosocial peers is predictive of abstinence from alcohol use (Spoth, Redmond, Hockaday, & Yoo, 1996). Prosocial peer groups are also a protective factor against violent behavior among youths (Group for Advancement of Psychiatry, 1999).

Thus, an initial goal of this investigation was to further examine associations between peer behavior and adolescents' concurrent health-risk behavior. Four domains of potential peer influence most relevant to health-risk behavior were examined in this study (i.e., peers' deviant, substance use, prosocial,

and suicidal behaviors), and the associations of these peer behaviors with adolescents' own substance use, violent, and suicidal behaviors were examined to extend past findings.

Given the consistent findings regarding linkages between peers' and adolescents' health-risk behaviors, an important step for further research is the investigation of factors that may compound this effect. Evidence for such factors is crucial for the prevention of adolescent onset and maintenance of health-risk behavior (Jessor, 1991). Consistent with the idea that a social learning effect may be enhanced under particular vulnerable conditions, we hypothesized that risk factors such as low support in peer or family domains, or psychopathology, may make adolescents more susceptible to negative peer influence and more prone to imitate the risk behavior of their friends. Therefore, the second and main goal of this study was to advance work in this area by investigating factors that contribute to the prediction of adolescents' health-risk behavior beyond the impact of peers' behavior. To address this goal, we proposed and examined two risk factor models in this study. First, a multiplicative model was investigated, including specific risk factors (described below) that may moderate the association between peers' and adolescents' risk behavior. This model suggests that psychosocial moderators may alter the magnitude of the association between peers' and adolescents' health-risk behavior, such that the presence of a moderator may heighten or attenuate the effects of peers' behavior.

Second, we posited an additive model of cumulative risk for adolescent health-risk behavior. Although this model similarly tells us about increased risk, the additive model represents a notably different approach, yielding findings that can inform clinical work in a different way. Specifically, while the multiplicative model provides information on factors that change the strength of the association between peers' and adolescents' risk behavior, the additive approach yields information on the added power to identify risky adolescents based on the combined effects of multiple risk factors in addition to peer behaviors (Sameroff, Seifer, & Bartko, 1997). Thus, this model focuses on the aggregation of risk factors, rather than the synergistic psychological consequences of simultaneous risk factors (Kazdin & Kagan, 1994).

Three risk factors previously investigated in relation to adolescent substance use, violence, and suicidality were included in tests of these theoretical

models. This allowed for an examination of the utility of the same risk models across different health-risk outcomes to determine whether models predict specific outcomes or general risk behavior. First among these risk factors was family dysfunction. Prior research on adolescents' substance use has frequently examined main effects of family functioning, or the relative contributions of family and peer influences. Multiple aspects of family functioning have been explored, such as parents' substance use (Chassin, Rogosch, & Barrera, 1991), parental monitoring (Dishion & Loeber, 1985), family support/cohesion (Wills & Cleary, 1996), and parent/adolescent communication (Windle, 1999), providing support for a linkage between each domain of family functioning and adolescents' substance use. Inadequate parental monitoring has similarly been implicated as a contributing factor for adolescents' illegal and violent behavior (see Dahlberg, 1998, and Dishion & McMahon, 1998, for reviews), and these domains of family functioning have also been consistently associated with suicidal ideation and behavior (see Wagner, 1997, for a review). More rare have been investigations that examined these domains of family functioning as moderators of the association between peers' and adolescents' risk behavior, or within a cumulative risk model (e.g., Stice, Barrera, & Chasin, 1998). For example, prior research has suggested that among high-risk adolescents, lax parental monitoring exacerbates the influence of deviant peer affiliation (Mason, Cauce, Gonzalez, & Hiraga, 1996). Similarly, lower levels of authoritative parenting heighten the influence of drug-using friends on teens' own substance use (Mounts & Steinberg, 1995).

Because we expected that each of these manifestations of family disturbance is likely to occur within dysfunctional, disorganized families, we used an overall index of family dysfunction. We hypothesized that, above and beyond the main effects of family dysfunction and peers' risk behavior, the combination of both risk factors would heighten adolescents' risk for substance use, violent behavior, and suicidality. Using the both the multiplicative and additive theoretical models, we examined this premise.

A second important risk factor for consideration in both multiplicative and additive risk factor models is adolescents' perceptions of overall social acceptance. Teens' overall peer status, as well as behavioral characteristics of their close friends, uniquely and significantly contributes to psycho-logical adjustment (Hartup, 1996). For instance, low peer status and adolescent deviant peer affiliation are each unique predictors of conduct disordered behavior (Dishion, Patterson, Stoolmiller, & Skinner, 1991). Adolescents' perceived peer rejection has also been associated with depression, substance use, and suicidality (Panak & Garber, 1992; Prinstein, Boergers, Spirito, Little, & Grapentine, 2000). We therefore hypothesized that a combination of low social acceptance and adolescents' affiliation with risky peers would be associated with increased risk for health-risk behavior.

Last, the hypothesized models also considered the role of depression symptoms. At a univariate level, depression and negative affect have been linked to cigarette, marijuana, and heavy alcohol use (e.g., Stice et al., 1998), aggression (e.g., Capaldi, 1991), and suicidality (e.g., Lewinsohn, Rohde, & Seeley, 1996). We expected that adolescents' depressive symptoms would similarly moderate the association between peers' and adolescents' substance use, violent behaviors, and suicidality and also contribute to a cumulative risk factor model.

Method

Participants

Participants included 527 adolescents (229 boys, 43.5%; 298 girls, 56.5%) in grades 9 (27.4%), 10 (26.8%), 11 (22.5%), and 12 (23.3%) from an urban, southern New England high school. Adolescents came from ethnically diverse backgrounds (22.4% White/Caucasian; 59.1% Hispanic American; 11.1% African American; 7.5% Other/Mixed Ethnicity) within a city of fairly homogeneous socioeconomic status (SES) (median family income = $33,679; Census of Population and Housing, 1990).

Procedures

Data were collected anonymously as a screening procedure for a school-sponsored mandatory health program to which the authors consulted. Personal information included only grade, gender, and ethnicity. The school district approved the assessment battery and the hospital institutional review board (IRB) permitted the use of this data for research purposes. Parents were notified 3 weeks before the school data collection to decline their adolescents' participation, if desired. Less than 1% of parents de-

clined their adolescents' participation. Adolescents were assured of the confidentiality of their responses and that participation was voluntary (96% agreed to participate). With these few exceptions, all students present on the four days of testing completed the packet of questionnaires (91.1% of total school population). All adolescents successfully completed the measures within the allotted time at individual tables in the school cafeteria to protect privacy, with an adult to adolescent ratio between 1:5 and 1:10. Each protocol was thoroughly checked and discarded for inconsistencies or missing responses. Data were excluded for 6.7% of participants who were missing data on one of the primary measures in this study. This yielded a final sample of 527 adolescents with complete data for these analyses. There were no statistically significant differences between excluded adolescents and this final sample on demographics, peer behaviors, health-risk behavior, or depression.

Measures

Peer Behavior Inventory (PBI). The PBI was developed for this study as an extension of existing measures of peer affiliation. As in prior measures of deviant peer affiliation (e.g., Dishion et al., 1991; Fergusson & Horwood, 1996), adolescents are asked to list how many of their friends engage in specific problematic behaviors, and a composite score is computed to indicate the extent of adolescents' affiliation. The PBI includes the seven items from the Dishion et al. (1991) measure of deviant peer affiliation, plus an additional 12 items included to assess affiliation with peers who engage in substance use, prosocial, and suicidal behavior. Adolescents are first asked to list the number of their closest friends ($M = 5.44$, $SD = 4.00$ in this sample) and the initials and gender of each friend to confirm that adolescents are thinking of specific individuals. Next, adolescents are asked to indicate the number of these close friends who engage in a variety of health-risk behaviors. A ratio score (between 0 and 1.0) was then computed for each item, and mean scores across items were derived according to the results of factor analyses presented below. Prior research indicates that this assessment of friends' behaviors is a reliable and valid procedure compared to teacher-, parent-, and peer-report of friends' behaviors. Adequate correspondence between parent-, teacher-, and adolescent-reported peer behavior (*r*s from .30

to .54) has been previously reported (Dishion et al., 1991; Fergusson & Horwood, 1996).

Youth Risk Behavior Surveillance Survey (YRBS). Items from the YRBS (CDC, 1998) were used for the assessment of health-risk behavior. Seven risk behaviors were assessed, including the frequency of three substance use behaviors: *cigarette use* ("On how many days did you smoke cigarettes?"), *heavy episodic drinking* ("On how many days did you have 5 or more drinks of alcohol in a row, that is, within a couple of hours?"), and *marijuana use* ("On how many days did you use marijuana?"); two items on suicidality: *suicidal ideation* ("Did you ever seriously consider attempting suicide?"), and *suicidal behavior* ("How many times did you actually attempt suicide?"); and two violent behaviors: *weapon carrying* ("On how many days did you carry a weapon such as a gun, knife, or club?"), and *physical fighting* ("How many times were you in a physical fight?"). On the YRBS, frequencies of substance use and weapon carrying within the past 30 days are assessed, and behaviors that occur less frequently in adolescence, including suicidality and physical fights, are assessed within a 12-month period. As expected in this normative sample, frequencies of each risk behavior were positively skewed; thus, a log transformation was applied for use in statistical analyses.

Family Assessment Device (FAD). The FAD (Epstein, Baldwin, & Bishop, 1983) is a well known 60-item instrument based on the McMaster model of family functioning that has frequently been used in investigations of adolescent risk-taking behaviors. The global dysfunction (12 items) subscale was used in this study. Adolescents respond to each item on a 1 (strongly disagree) to 4 (strongly agree) scale of agreement. Internal consistency coefficients for FAD subscales between .72 and .92 have been reported, as well as 1-week test-retest reliability ranging from .66 to .76 (Epstein et al., 1983; Miller, Epstein, & Bishop, 1985). Internal consistency in the current sample was .88.

Self-Perception Profile for Adolescents (SPPA). The SPPA (Harter, 1988) assesses adolescents' judgments of competence or adequacy in different areas of self-concept. All subscales contain six items, and each item is coded with a score of 1 through 4; mean scores are computed with higher scores reflecting greater perceived competence. In this study, the Social Acceptance subscale was included as a measure of adolescents' perceived peer status. Harter (1988)

Table I. Factor Analysis of Peer Behavior Inventory Items

Item: How many of your friends . . .	Factor Loading			
	I	II	III	IV
Have stolen something worth more than $50	.79[a]	−.17	.38	.28
Ruined or damaged other people's things on purpose	.76[a]	−.20	.23	.29
Could have gotten into trouble with the police for some of the things they have done	.75[a]	−.14	.24	.42
Have broken into a place, like a car or building to steal something	.75[a]	−.17	.47	.22
Have suggested that you do something against the law	.70[a]	−.20	.38	.29
Have stolen something worth less than $5	.66[a]	−.06	.16	.48
Have hit or threatened to hit someone without a reason	.59[a]	−.12	.33	.35
Have cheated on school tests	.36[a]	.08	.09	.40
Get good grades	−.30	.63[a]	−.10	−.14
Are liked by teachers	−.31	.60[a]	−.09	−.18
Have been involved in school clubs/teams	−.11	.52[a]	−.04	−.09
Are liked by most other teenagers	−.01	.49[a]	−.16	.18
Have helped other teens who are having problems	−.01	.39[a]	.04	.09
Have talked about wanting to hurt themselves, or about suicide	.40	−.08	.84[a]	.16
Have attempted to kill themselves	.40	−.04	.83[a]	.07
Have gotten drunk	.40	.08	.11	.87[a]
Have used marijuana	.56	−.03	.12	.70[a]
Have smoked cigarettes	.45	−.03	.23	.58[a]
Disapprove of using drugs or alcohol	.20	−.36	−.04	−.43[a]
Percent variance explained	28.59	8.18	7.10	4.05

[a]Items included in each factor.

reported good internal consistency for these subscales (Cronbach's α ranged from .74 to .93), as well as considerable support for the validity of these subscales. Internal consistency in the current sample was .75.

Center for Epidemiological Studies-Depression (CES-D). The CES-D is a widely used 20-item measure for the assessment of depression symptoms in both normative and clinical samples of adolescents (Hogue & Steinberg, 1995; Roberts, Andrews, Lewinsohn, & Hops, 1990). Good psychometric data exist for the use of the CES-D with adolescents, including high internal consistency (over .87), and a stable factor structure when re-administered 1 month later (Roberts et al., 1990). Cronbach's alpha in the current sample was .92.

Results

Preliminary Analyses

A principal axis factor analysis using an oblique rotation for the 19 items of the PBI revealed four significant factors (eigenvalues > 1), cumulatively accounting for 47.93% of the variance. Table I lists factor loadings over .35 for each item of the PBI. Use of an oblique rotation led to several significant cross-loadings (over .35), although with one exception, each of these items more strongly loaded on its expected factor and were therefore included with this factor in the composites described below. (The item on friends' cheating behavior was included on the deviant factor to replicate past work using this item.) Factor I (Deviant) included all seven of the original items of deviant peer influence from Dishion et al. (1991), as well as one additional item reflecting illegal behavior (i.e., "How many of your friends could have gotten into trouble for some of the things they have done?"). Factor II (Prosocial) included five items of prosocial or adaptive friend behaviors. Factor III (Suicidal) included two items reflecting friends' suicidal ideation and behavior, and Factor IV (Substance Use) included three substance use items, as well as one negatively loaded item reflecting friends' disapproval of substance use. Subscales were computed as means of the items that loaded onto each factor, yielding four subscales

with adequate internal consistency: Deviant (eight items, Cronbach's $\alpha = .85$), Substance Use (four items, $\alpha = .74$), Prosocial (five items, $\alpha = .62$), and Suicidal (two items, $\alpha = .82$). Thus, each subscale score indicated the average proportion of friends who engaged in each type of behavior; these scores ranged from 0–1.0 for each subscale.

Paired t test analyses revealed significant differences for the overall frequencies for each of the four peer behaviors. Adolescents reported the greatest proportion of friends who engaged in prosocial behaviors, followed by substance use peer behaviors, deviant peer behavior, and suicidal peer behavior, respectively (overall Wilks's $\Lambda (3, 524) = 756.55$, $p < .0001$, see Table II for means). ANOVA analyses were conducted to examine gender, grade, and ethnic differences in the frequencies of each peer behavior and revealed the following effects: boys reported a significantly greater proportion of friends who engaged in deviant behavior, $F (1, 525) = 42.50$, $p < .0001$, and girls reported more friends who engaged in prosocial behavior, $F (1, 525) = 43.79$, $p < .0001$ (see Table II). No significant main effects were revealed for grade or ethnicity, nor any significant interactions for gender, grade, or ethnicity.

Correlations computed between the peer behavior variables revealed significant associations between each of the four areas of potential peer influence (see Table III). For instance, adolescents with higher proportions of friends who engaged in deviant behaviors also indicated higher levels of their friends' substance use and suicidal behaviors and lower proportions of friends who engaged in prosocial behavior.

Associations Between Peer Behavior and Health-Risk Behavior

Analysis of partial variance techniques examined the shared and unique effects of peer behavior on the frequency of adolescents' health-risk behavior. For each risk behavior, regressions included demographic covariates (gender, grade, and adolescents' total number of friends) on an initial step, and the set of peer behaviors (deviant, substance use, prosocial, and suicidal behaviors) on a second step.

Overall, the results suggested that peer behaviors accounted for a significant and substantial proportion of explained variance (i.e., 5%–27%; see Table IV) in adolescents' health-risk behaviors. For instance, for substance use risk behaviors, adolescents' affiliation with friends who themselves engaged in substance use was a consistent predictor. Adolescents' cigarette use was also associated with the proportion of friends who engaged in suicidal behavior and negatively associated with the proportion of friends who engaged in prosocial behavior.

Table II. Means (and Standard Deviations) of Peer Behaviors

Peer Behaviors	Total ($n = 527$)	Boys ($n = 229$)	Girls ($n = 298$)
Deviant	.18 (.20)[a]	.25 (.24)	.14 (.15)[b]
Substance use	.36 (.28)[a]	.37 (.29)	.37 (.28)
Prosocial	.68 (.21)[a]	.60 (.23)	.73 (.20)[b]
Suicidal	.01 (.19)[a]	.01 (.21)	.01 (.17)

[a]Column means for the total sample are significantly different ($p < .0001$).
[b]Significant gender difference ($p < .0001$).

Table III. Intercorrelations Between Peer Behaviors, Family Dysfunction, Social Acceptance, and Depression

	Peer Behaviors			Potential Moderators		
	Substance use	Prosocial	Suicidal	Fam. dysfunc.	Soc. accept.	Depression
Peer behaviors						
Deviant	.52***	−.18***	.40***	.16***	.06	.10*
Substance use		−.14***	.23***	.13***	.10*	.14**
Prosocial			−.10**	−.20***	.17***	−.08
Suicidal				.22***	−.07	.27***
Potential moderators						
Family dysfunction					−.25***	.47***
Social acceptance						−.32***
Mean (SD)				2.05 (.59)	3.12 (.67)	1.83 (.52)

$n = 527$ for all correlations.
*$p < .05$.
**$p < .01$.
***$p < .001$.

Table IV. Peer Behaviors as Predictors of Adolescent Health-Risk Behavior

	Substance use			Suicidality		Violence	
	Cigarette	Heavy episodic drinking	Marijuana	Suicidal ideation	Suicidal behavior	Weapon carrying	Physical fighting
Step 1: (r^2)	.01	.05***	.02**	.03**	.01	.06***	.03**
Gender (female = 1) (β)	.05	−.11*	−.05	.14**	.10*	−.13**	−.07
Grade (β)	.07	.05	.02	.09	.01	−.03	−.05
Total n of friends (β)	.04	.07	.03	−.04	.01	.01	.02
Step 2: Peer behaviors ($r^2\Delta$)	.16***	.21***	.27***	.05***	.07***	.08***	.13***
Deviant (β)	−.02	.33***	.27***	−.06	−.05	.30***	.20***
Substance use (β)	.31***	.18***	.33***	.06	.02	−.02	.17**
Prosocial (β)	−.10*	.02	−.05	.00	−.07	−.12**	−.11*
Suicidal (β)	.12**	.04	−.04	.22***	.26***	−.09	.03
Overall F	14.99***	26.31***	30.01***	5.82***	5.43***	12.46***	14.26***

*$p < .05$.
**$p < .01$.
***$p < .001$.

Adolescents' more risky substance use behaviors, including heavy episodic drinking and marijuana use, were also associated with friends' substance use behavior and friends' deviant behavior. Findings also demonstrated that adolescents' suicidal ideation and behavior were generally associated with friends' suicidal behaviors. For adolescents' violent behavior, higher proportions of friends' deviant behavior was a consistent predictor, whereas higher proportions of friends' prosocial behavior were associated with lower frequencies of adolescents' violent behavior, and higher proportions of friends' substance use behaviors were associated with physical fighting.

Moderator Models of Health-Risk Behavior

A second goal of this investigation was to examine three potential moderators of the relationship between peer behavior and adolescents' health-risk behavior, including family dysfunction, social acceptance, and depression. Intercorrelations between these potential moderators and peer behaviors are presented in Table III. To test the multiplicative model of risk, moderators were added on the second step to each of the regression models described above, and specific product terms between peer behaviors and each moderator were computed and entered on a third step. For example, to examine family dysfunction as a moderator for adolescents' substance use behavior, we examined a family dysfunction by peer substance use behavior term; for adolescents' suicidality, a family dysfunction by

peer suicidal behaviors term; and for violent behavior, a family dysfunction by peer deviant behavior term. Results are presented separately for each of the three potential moderators.

Family Dysfunction. A significant $r^2\Delta$ and beta (β) for the interaction term were revealed for four models, supporting the moderator hypothesis for adolescents' weapon carrying ($r^2\Delta = .01$, β = .40, $p < .05$), cigarette use ($r^2\Delta = .01$, β = .37, $p < .05$), marijuana use ($r^2\Delta = .01$, β = .32, $p < .05$), and suicidal behavior ($r^2\Delta = .01$, β = .40, $p < .05$). For all four significant models, an ordinal interaction was revealed, indicating the following effects: high proportions of friend behaviors coupled with high levels of family dysfunction were associated with the highest frequencies of health-risk behavior, followed respectively by combinations of high proportions of friend behaviors and low family dysfunction, low proportions of friend behaviors and high family dysfunction, and finally, low proportions of friend behaviors and low family dysfunction, which were related to the lowest levels of adolescents' risk behavior.

Social Acceptance. A similar pattern of results was revealed for social acceptance as a moderator of the association between peer behaviors and adolescents' suicidal behavior ($r^2\Delta = .02$, β = −.67, $p < .001$), weapon carrying ($r^2\Delta = .03$, β = −.95, $p < .0001$), and marginally for suicidal ideation ($r^2\Delta = .01$, β = −.36, $p < .10$) and physical fighting ($r^2\Delta = .01$, β = −.40, $p = .10$). For each health-risk behavior, adolescents' perceived social acceptance attenuated the association between high proportions of

friends who engaged in specific risk behavior and adolescents' health-risk behavior.

Depression. Depression was a significant moderator in two models of adolescents' health-risk behavior: suicidal behavior ($r^2\Delta = .03$, $\beta = .74$, $p < .001$) and physical fighting ($r^2\Delta = .01$, $\beta = .42$, $p < .01$). For each outcome, high levels of depression with high proportions of friends' specific risk behavior were related to the highest levels of adolescents' own health-risk behavior.

Cumulative Risk Factor Model

The additive effect of multiple risk factors on adolescents' health-risk behavior was next examined by computing clinical cutoff scores for each of the risk factors and predictors presented above. Risk status for each investigated factor was computed as scores one standard deviation above the mean for family dysfunction and depression, and one standard deviation below the mean for social acceptance, which corresponded to established cutoff scores and national norms on the FAD, CESD, and SPPA scales. Adolescents with scores one standard deviation above the mean for each area of peer behavior (i.e., deviant, substance use, prosocial, and suicidal behavior) were also assigned a score indicating "risk" status; all risk variables were dummy coded (1 = risk). Thus, a continuous cumulative risk composite variable was computed for each adolescent, ranging between 0 and 4, indicating the number of scores above clinical cutoffs. When we examined adolescents' substance use outcomes, this composite included peer substance use behaviors; peer suicidal behaviors were included in the composite when we examined adolescents' suicidality, and deviant peer behaviors were included for adolescents' violent outcomes.

To obtain relative risk estimates for the additive effects of multiple risk factors, the cumulative risk factor model was examined using logistic regression procedures. Outcome variables of health-risk behavior were dichotomized to indicate the presence or absence of risk behavior, which also corresponded to cutoffs established by standard deviations. For each logistic regression, grade and gender were entered on an initial step, followed by the cumulative risk variable on a second step. Table V lists the χ^2 change for the second step of each model, as well as the Wald's value and relative risk ratio for the cumulative risk composite for each of the seven outcomes. The cumulative risk composite was a sig-

Table V. Logistic Regression Results for Number of Risk Factors on Adolescents' Health-Risk Behavior

Adolescents' health risk behavior outcome	Cumulative risk factor composite[a]		
	$\chi^2 \Delta$ (3)	Wald	Relative risk
Substance use			
Cigarette	31.38***	31.01	2.04
Heavy episodic drinking	37.03***	18.68	1.78
Marijuana	37.03***	36.19	2.27
Suicidality			
Suicidal ideation	64.53***	58.13	3.01
Suicidal behavior	45.05***	43.19	2.85
Violence			
Weapon carrying	12.32***	12.83	1.89
Physical fighting	13.17***	13.35	1.52

[a]Results presented for step 2 of the regression model after controlling for gender and grade on step 1.
***$p < .0001$.

nificant predictor for each health-risk behavior outcome; this model correctly identified 57% to 84% of risky adolescents across outcomes. The relative risk ratios ranged from 1.52 to 3.01, suggesting that for each additional risk factor, adolescents' likelihood of engaging in health-risk behavior approximately doubled. For instance, for suicidal behavior, the results indicated that out of 319 adolescents with zero risk factors, 3.5% reported a suicide attempt; out of 133 adolescents with one risk factor, 15.5% attempted suicide; out of 55 adolescents with two risk factors, 21.2% attempted suicide, and of the 20 teens with three or more risk factors, 52.6% attempted suicide.

Discussion

Reducing the prevalence of adolescent substance use, violent behavior, and suicidality are among the most crucial national health objectives. Each of these health-risk behaviors has been linked with adolescents' and adults' physical and mental health, morbidity, and mortality. This study provided preliminary support for several risk models informing prevention efforts for these serious health-risk behaviors.

An initial goal of this study was to further examine peer behaviors as predictors of adolescents' health-risk behavior. Consistent with past research, strong significant associations indicated that adolescents who carried a weapon or engaged in high frequencies of physical aggression also had high

proportions of friends who engaged in deviant behavior. Similarly, the frequencies of adolescents' cigarette use, heavy episodic drinking, and marijuana use were strongly related to the proportion of their friends who used illegal substances. As noted in related studies, these results present important challenges for prevention efforts, given that these health-risk behaviors appear to be entrenched within adolescents' close friendships. Thus, attempts to alter adolescents' behavior should recognize that changes in behavior may have social consequences as well (La Greca, Prinstein, & Fetter, 2001).

These results, like prior work, suggest that violent and substance use behaviors may be socially reinforced by close friends, indicating that an efficacious strategy for reducing adolescents' risk behavior may be peer-led interventions that would promote adaptive, nonrisk behavior as a more positive counterinfluence on adolescents' risk behavior. Results indicated that adolescents with high proportions of friends who engaged in prosocial behaviors (e.g., assisting troubled teens; involvement in school activities) were less likely to engage in violent and substance use behaviors themselves. In designing peer interventions, therefore, it might be important to include a combination of prosocial and deviant peers to maximize prosocial influence and avoid the exclusive participation of deviant teens, which has been shown to exacerbate antisocial behavior (Dishion, McCord, & Poulin, 1999). Overall, these results offer encouraging empirical support for the idea that peers can exert positive, as well as deleterious, influences on adolescents' health behavior.

This study provided initial support for the hypothesis that adolescents' suicidal ideation and suicidal behavior are related to the suicidality of their closest friends. This idea has been intimated in prior work on suicide contagion within schools and small communities; however, past research on suicide exposure has more typically focused on suicidal behavior among family members, rather than peers (Sorenson & Rutter, 1991). These results underscore the need for assessment of adolescents' exposure to close friends' suicidal behavior when determining risk for suicidality. Although past work has suggested that adolescents likely affiliate with peers with similar levels of depressive symptoms, which leads to increased negative affect over time (Hogue & Steinberg, 1995), investigations examining specific ways in which peer relationships can

lead to adolescent suicidal ideation or behavior have been rare (Prinstein et al., 2000). Thus, this study provides new evidence to suggest that experiences with peers who engage in self-harm behaviors may lead to adolescents' own self-harm behavior and suicidality. When a suicidal adolescent is identified, clinicians may wish to screen for suicidality in his or her closest friends as well.

By examining several forms of peer behavior and multiple risk outcomes, we obtained results suggesting numerous ways in which peers may influence adolescents' health-risk behavior. While accomplishing these goals, this study also provided good preliminary support for an adapted measure of different types of peer behavior. A stable factor structure and adequate to good internal consistency for the subscales of this measure were revealed. Preliminary analyses of this measure also provided some evidence for the extent to which adolescents are influenced toward different behaviors. The good news is that adolescents were most likely to report affiliations with friends who engaged in prosocial behaviors. The bad news is that adolescents also indicated that a substantial proportion of their friends engaged in substance use and deviant behaviors. Indeed, closer examination of these results indicates that, for 80% of the sample, at least one of an adolescent's closest friends engaged in deviant behavior, and for over 86% of teens, at least one of an adolescent's closest friends used illegal substances. However, almost all adolescents (97%) indicated that at least one of their friends engaged in prosocial behavior as well. These results suggest that most adolescents are exposed to both adaptive and maladaptive sources of influence and thus receive conflicting messages of reinforcement within their peer group. In contrast to the ambitious goal of eliminating adolescents' affiliation with deviant peers, primary prevention efforts may be most successful in identifying factors that lead these multiply influenced adolescents to refrain from risk behavior themselves.

The search for such moderators of the association between peers' and adolescents' health-risk behaviors was a main goal of this investigation. Within each moderator model, a mild but significant multiplicative effect was revealed, suggesting that family dysfunction, social acceptance, and depression each had the potential to alter the magnitude of the association between peers' and adolescents' risk behavior. In other words, adolescents may be particularly vulnerable to a social

learning effect from risky peers when experiencing high levels of social or psychological distress. For instance, adolescents whose closest friends engaged in deviant behavior were more likely to carry a weapon themselves if they were part of a family with high levels of dysfunction, or if they perceived themselves to be socially rejected within their larger peer group. Similarly, adolescents with friends who engaged in substance use were more likely to use cigarettes or marijuana if their family had high levels of dysfunction. And most notably, among adolescents with suicidal close friends, adolescents' suicidal behaviors occurred more frequently when accompanied by high levels of family dysfunction, low social acceptance, or high levels of depression. In sum, these results suggest that teens referred for risky or deviant behavior may benefit from family therapy as well as assessment and treatment of depression and social dysfunction, which may increase resiliency among teens who affiliate with risky peers.

Examination of the cumulative risk factor model further informed efforts to identify and prevent health-risk behavior by revealing the additive effects of multiple risk factors on adolescents' behavior. As in research examining developmental outcomes (e.g., low IQ; Sameroff et al., 1997), this approach provided important information on the effects of aggregated risk factors. For all health-risk behavior outcomes, the results suggested that the number of adolescents' risk factors, including peers' risk behaviors, family dysfunction, social acceptance, and depression, was strongly associated with the likelihood that adolescents engaged in risk behavior. Most striking, however, was the added power to predict concurrent health-risk behavior using this model, with the probability of adolescents' risk behavior increasing twofold for each added risk factor. These results have direct implications for health screening procedures. Adolescents who present with a single risk factor, such as affiliation with risky peers, might be screened for additional risk factors.

Future work would benefit by addressing some of the limitations of this investigation. The measurement of health-risk behavior in this study was restricted to self-reported, single-item indicators to meet the needs of the school program. Previous investigations have similarly used single items for the assessment of adolescent risk behavior (e.g., CDC, 1998; Jessor, Donovan, & Costa, 1991; La Greca et al., 2001); thus, these data are comparable to those

of related investigations. Nevertheless, future work would benefit from the inclusion of more thorough measures of risk behavior and from additional reporters. The availability of data directly from adolescents' peers would enhance the assessment of peers' behaviors in future work and reduce the possible bias inherent in self-report assessment. This may also allow for comparisons between the effects of adolescents' perception of their friends' risk behaviors and their friends' actual behavior.

The data used in this study were from a single time point, thereby limiting conclusions regarding directionality between peers' behavior, psychosocial moderators, and adolescents' health-risk behavior. This serious concern has recently been addressed in longitudinal work, confirming reciprocal, transactional associations between peers' and adolescents' substance use and violent behavior (Stein, Newcombe, & Bentler, 1987). It appears that in many cases, peer behaviors do precede and prospectively predict adolescents' future health-risk behavior (Keenan et al., 1995). Recent work has also suggested that social and psychological distress predicts initial affiliation with risky peers (Dishion et al., 1991). Thus, an important direction for future work will be the use of prospective designs to discover whether social-psychological distress is a distal influence on health-risk behavior by leading to relationships with risky peers as well as a proximal influence by exacerbating the social learning effects of these risky affiliations.

The dramatic impact of adolescent health-risk behavior on national public health underscores the need for pediatric psychologists to be working and conducting research in schools and in pediatric primary care settings where at-risk adolescents present most frequently. This investigation offers new evidence for factors that may compound or mitigate the association between adolescents' and their friends' health-risk behavior and provides empirical support for these risk factor models across a range of health behavior outcomes, including serious high-risk behaviors (e.g., weapon carrying). This study is among the first to examine peer influences on adolescent suicidal ideation and behavior and to examine both prosocial and risky peer influences on adolescent health behavior. Given the strong role that peers play in health-risk behavior, interventions that take advantage of opportunities to intervene simultaneously with adolescents and their peers (e.g., in school clinics) might be particularly promising.

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