

# Role of Parent Support and Peer Support in Adolescent Substance Use: A Test of Mediated Effects

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This research tested comparative effects of parent and peer support on adolescent substance use (tobacco, alcohol, and marijuana) with data from 2 assessments of a multiethnic sample of 1,826 adolescents, mean age 12.3 years. Multiple regression analyses indicated that parental support was inversely related to substance use and that peer support was positively related to substance use, as a suppression effect. Structural modeling analyses indicated that effects of support were mediated through pathways involving good self-control, poor self-control, and risk-taking tendency; parent and peer support had different patterns of relations to these mediators. The mediators had pathways to substance use through positive and negative recent events and through peer affiliations. Effects for gender and ethnicity were also noted. Mechanisms of operation for parent and peer support are discussed.

Research with adults has consistently indicated that social support is a protective factor for health status, with higher support related to lower levels of mental and physical symptomatology (S. Cohen & Wills, 1985). Relations of social support to lower rates of substance use have been suggested as one mechanism of the protective effect (House, Landis, & Umberson, 1988), and evidence from epidemiologic research is generally consistent with this proposition (Wills & Filer, 2001). Studies of adults have shown that structural and functional support measures are inversely related to prevalence rates for cigarette smoking (e.g., Hanson, Isacson, Janzon, & Lindell, 1990; Umberson, 1987) and alcohol use (e.g., Brennan & Moos, 1990; Peirce, Frone, Russell, & Cooper, 1996). These studies typically combined support from family, friends, and workmates, although there are some exceptions (Fondacaro & Heller, 1983).

A consistent theme in adolescent psychology, however, is that adolescents participate in two different types of social networks: (a) the family network and (b) the peer network. Adolescents' involvements with these social networks may have different correlates and consequences (Larson, 1983; Wills, 1990). Emotional/

instrumental support from parents and other adults has consistently been found to be a protective factor (e.g., Barrera, Chassin, & Rogosch, 1993; Dubow & Tisak, 1989; Wills, Vaccaro, & McNamara, 1992). In contrast, effects for peer support are not consistent with a protective status (Greenberg, Siegel, & Leitch, 1983; Wills & Vaughan, 1989), so there has been a suggestion that parent and peer support may operate through different types of effects (Wills, Mariani, & Filer, 1996).

Research on various problem behaviors has shown differing results for types of support. For example, Windle (1992) studied correlates of measures from the Perceived Social Support Scale (Procidano & Heller, 1983) with a sample of 975 high school students with a mean age of 15.5 years. In multivariate models, family support was inversely related to both depressive symptoms and delinquency, whereas friend support was unrelated to depression and positively related to delinquency. The latter finding represented a suppression effect (Tzelgov & Henik, 1991), that is, a nonsignificant zero-order correlation together with a significant multivariate effect; such effects are often found for measures of peer social relationships (Wills, Mariani, & Filer, 1996). Lifrak, McKay, Rostain, Alterman, and O'Brien (1997) studied correlations of the Harter Social Support Scales (Harter, 1985b) with substance use in a sample of 271 middle school students with a mean age of 13.2 years. Zero-order correlations indicated that scales indexing support from parents and from teachers were inversely related to substance use, whereas scales indexing support from friends and classmates tended to be positively related to substance use. Piko (2000) obtained data on satisfaction with support from parents and from friends (Turner & Marino, 1994) from a sample of 1,039 Hungarian adolescents in secondary schools (age range: 15–19 years). Results from multivariate analyses indicated that support from father and mother was inversely related to use of tobacco, alcohol, and illicit drugs, whereas friend support was positively related to most types of substance use. Results for friend support tended to be suppression effects, although some of the zero-order correlations with substance use were positive in sign.

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Thus, there is evidence that parent support and peer support are related to substance use in opposite directions. Although the observed effect of parental support is generally consistent with theory on adolescents (Brook, Brook, Gordon, Whiteman, & Cohen, 1990; Jessor & Jessor, 1977), the role of peer support is not as well understood. It is not obvious why supportive relationships would be related to socially deviant behaviors such as delinquency, and the positive relationships to substance use have been perplexing to several of the investigators. Moreover, findings for peer support tend to occur as suppression effects, having nonsignificant zero-order correlations with outcomes but showing significant effects with positive sign in multivariate analyses (Piko, 2000; Windle, 1992). Such findings suggest that effects of peer support are complex and may involve several pathways, with different types of relations to substance use (Wills, Mariani, & Filer, 1996).

These complex findings suggest a need for research to clarify the pathways from support to substance use. Theoretical work about adolescents has suggested that the functions of parental and peer relationships differ on several dimensions (Brown, Dolcini, & Leventhal, 1997; Crockett & Crouter, 1995; Larson, Csikszentmihalyi, & Freeman, 1984; Maggs, Almeida, & Galambos, 1995). For example, parental relationships are more focused on task accomplishment, whereas peer relationships are more focused on social activities with positive hedonic tone; parents are more focused on goal-oriented and controlled behavior, whereas peers are more focused on spontaneous and sometimes impulsive behavior; and parents tend to have more conventional values, whereas peer networks may have more favorable attitudes toward smoking and alcohol use. Thus, there is a need to investigate variables that are differentially correlated with parent support and peer support and to test the role of these variables as pathways to adolescents' substance use.

The present research used functional measures of parent support and peer support, obtained from a community sample of adolescents. We examined the correlates of each type of support and the comparative effects of parent and peer support on adolescent substance use. Mediation testing with a range of psychosocial variables was used to determine probable pathways through which effects of support were mediated, and these pathways were tested in structural modeling analysis. The overall hypothesis was that effects of parental support would be primarily mediated through relations to better self-control ability, whereas effects of peer support would have different pathways, including relations to more impulsive behavior (cf. Wills, Blechman, & McNamara, 1996; Wills, Sandy, & Yaeger, 2000). Analyses were performed with data from two assessments to determine replicability for effects of support at two age points: (a) early and (b) middle adolescence.

The structural model was specified on the basis of previous developmental theory about relations between distal and proximal factors for adolescent substance use (Tarter & Vanyukov, 1994; Wills, Sandy, & Yaeger, 2000). It is posited that social support is a distal factor that operates from relatively early ages to influence intermediate variables, such as self-control and preference for conventional versus risky behaviors. Self-control ability is posited to affect exposure to life events and development of established competencies (e.g., academic performance), whereas risk-taking tendency is more likely to influence preference for deviant behaviors and hence could have direct effects on deviant peer affiliations and substance use. Negative events occurring to adolescents in

school or home settings are construed as consequences of self-control that could occur through either lack of planning (e.g., failure to complete homework) or impulsive responding (e.g., talking back to an adult); conversely, positive events may be based on exercise of planning and problem-solving skills. Life events and developed competencies are hypothesized to influence likelihood of substance use as indirect effects through influencing patterns of peer affiliation and possibly through direct effects based on acceptance versus rejection of conventional values (Jessor & Jessor, 1977; Mosbach & Leventhal, 1988; Wills, Windle, & Cleary, 1998). Aspects of this approach to vulnerability and protection have been demonstrated in cross-sectional and longitudinal studies conducted in early adolescence (Wills & Cleary, 1999; Wills et al., 2001; Wills, Gibbons, Gerrard, & Brody, 2000). Within this conceptual framework, parent and peer support are predicted to have their primary mediated effects through relations to self-control constructs and risk-taking tendency, which are then related to more proximal factors for substance use such as life events and peer affiliations. Direct effects from parental support to proximal factors are not ruled out, as these have been observed in some previous studies (e.g., Wills & Cleary, 1996).

## Method

The data derived from school-based research in which students completed a self-report questionnaire that included measures of parent and peer support and a range of other variables. Schools were surveyed in the seventh grade and the ninth grade.

### *Participants*

The participants were students in public school districts in lower Westchester County, New York. The school districts are in mixed urban-suburban communities that are socioeconomically representative of the state population (U.S. Department of Commerce, 1992). For the seventh-grade survey administration, conducted in six middle schools, the sample size was 1,826, and the mean age of the participants was 12.3 years ( $SD = 0.7$ ). For the ninth-grade survey administration, conducted in five high schools, the sample size was 1,612, and the mean age of the participants was 14.3 years ( $SD = 0.8$ ). There were comparable proportions of males (53%) and females (47%). Self-reported ethnic identification indicated that 27% of the participants were African American, 2% were Asian American, 24% were Hispanic, 36% were Caucasian, 6% were of other ethnicity, and 5% were of mixed ethnicity. An item on family structure indicated that 56% of participants were living with two biological parents, 33% were in a single-parent household, and 11% were in a blended family (i.e., one biological parent and one stepparent). Parental education had a mode of high school graduate and a mean just above high school graduate.

### *Procedure*

Data were collected through a self-report questionnaire administered to students in classrooms by trained research staff. The questionnaire took approximately 40 min to administer. Staff members followed a standardized protocol in giving instructions to students. After giving group instructions to students, staff members circulated in the classroom to answer any individual questions about particular items. The questionnaire was administered under confidential conditions, and the privacy of responses was protected by a Certificate of Confidentiality from the U.S. Public Health Service. Students were instructed not to write their names on the survey and were assured that all their answers were strictly confidential and would not be shown to their parents or teachers.

Adolescents participated under a consent procedure in which parents were sent by direct mail a notice that informed them about the purpose and nature of the study. The parent could elect to have a child excluded, if he or she wished, by notifying the investigator or calling the school. Participants were similarly informed about the research at the time of questionnaire administration and were told that they could refuse or discontinue participation. The completion rates, defined as the number of questionnaires obtained divided by the total class enrollment from school lists, were 93% and 83% for the seventh and ninth grades, respectively. Case loss due to parental and student refusals was low (<1%) for each administration. Student absenteeism or unavailability for testing was lower in seventh grade (4% and 2%, respectively) than in ninth grade (9% and 6%, respectively). For the ninth-grade data collection, there were fewer resources for repeated survey days to contact students who were absent or unavailable on their scheduled testing day, and this resulted in a smaller sample size.

## Measures

Aside from demographics, unless otherwise noted the measures were multi-item scales with 5-point Likert responses (range: *not at all true* to *very true*). Scales were scored such that a higher score indicates more of the named attribute. Scale structure was verified with factor analysis and internal consistency (Cronbach's alpha) analysis. Reliabilities were quite similar for the two assessments, and alphas are presented for the seventh-grade assessment.

**Demographics.** Two items asked about age and gender. Ethnicity was indexed with a measure that provided five options (African American, Asian American, Hispanic, Caucasian, and Other), with multiple responding allowed. An item on family structure asked with which adult(s) the participant currently lived (8 options, multiple responding allowed); this was recoded for analysis to three categories: (a) single-parent structure, (b) blended structure, or (c) intact structure. Two items assessed the level of education for father and mother. Responses were made on a 1–6 scale with anchor points *grade school* and *post-college* (master's or doctoral degree or other professional education).

**Parent and peer support.** Measures of parent and peer support were assessed in a response-based coping inventory (Wills, 1986). Items were introduced with the following statement: "Here are some things that people may do when they have a problem at school or at home. Read each one and circle a number (from 1 to 5) to show how much you do this when you have a problem." Response points were *never*, *a little*, *sometimes*, *pretty much*, and *always*. In the four-item parent support measure ( $\alpha = .89$ ), participants were asked about the extent to which they sought help from a parent, and wording recognized the possibility of a single-parent structure. Items were "I discuss my feelings with my mother/father," "I get emotional support from my mother/father," "I get sympathy and understanding from my parent(s)," and "I talk to my mother/father about how I feel." The four-item peer support measure ( $\alpha = .87$ ) asked participants about the extent to which they sought help from a friend to whom they felt close; items had the same wording, except the source of support was changed (e.g., "I get sympathy and understanding from a friend").<sup>1</sup>

**Self-control.** Generalized self-control was assessed with an 18-item inventory based on the Kendall–Wilcox Self-Control Rating Schedule (Kendall & Williams, 1982). The items ask about self-control in a variety of everyday situations. Good self-control (overall  $\alpha = .77$ ) was indexed with a four-item subscale on dependability (e.g., "When I promise to do something, you can count on me to do it") and a three-item subscale on planfulness ("I usually think before I act"). Poor self-control (overall  $\alpha = .78$ ) was indexed with a three-item subscale on impatience (e.g., "I have to have everything right away") and a seven-item subscale on distractibility ("I am easily distracted from my schoolwork").

**Coping dimensions.** Five dimensions of engaged or disengaged coping were assessed in the response-based inventory under the stem "When I have a problem, I \_\_\_\_." Engagement mechanisms (Carver, Scheier, &

Weintraub, 1989) were a 6-item scale on behavioral coping or problem solving (e.g., "I think of different ways to take care of it," "I do something to solve the problem";  $\alpha = .85$ ) and a 6-item scale on cognitive coping ("I try to see the problem in a different way";  $\alpha = .77$ ). Disengagement mechanisms were a 7-item scale on anger coping or "angerability" (e.g., "I take it out on someone else," "I get mad at people";  $\alpha = .88$ ), a 12-item scale on avoidant coping ("I try to put the problem out of my mind";  $\alpha = .82$ ), and a 4-item scale on helpless coping ("I give up trying to reach the goal";  $\alpha = .79$ ).

**Risk taking.** Items on risk taking were drawn from the Venturesomeness Inventory (Eysenck & Eysenck, 1978). Risk-taking tendency ( $\alpha = .77$ ) was indexed with the items "I'd prefer to do something a little risky rather than having to stay quiet for a few hours" and "I am confident that I can do things most people would consider dangerous."

**Recent events.** An inventory on recent positive or negative events was developed through a previous pilot study in which different respondents were asked to describe pleasant or unpleasant things that had happened to them during the last week. A 26-item inventory was developed, including events that could occur on a regular basis in family, school, or neighborhood settings. Items were administered with the lead-in statement "Here are things that happen to people sometimes. Read each one and circle a number to show if this happened for you during the past week." Response points were *not at all*, *once*, and *twice or more*. Scale analyses determined events that were consistently correlated with substance use across three different samples. Of 20 negative events in the inventory, 12 were positively correlated with substance use; these mainly concerned interpersonal conflicts in various domains (home, school, or peers) or being blamed or criticized by someone in these domains. The negative events had moderate intercorrelations, and we scored a 12-item scale for recent negative events, which had an alpha of .78. Of six positive events, four were inversely correlated with substance use, and these had only modest intercorrelations. Scored were a 2-item scale for academic positive events (e.g., "I got a good grade on my schoolwork"), which had an alpha of .45, and a 2-item scale for social positive events ("I went on a trip that I liked"), which had an alpha of .74.

**Academic and social competence.** Measures of developed competencies were obtained for academic and peer competence using the Perceived Competence Scales (Harter, 1985a). A seven-item scale indexing perceived competence in academic settings (e.g., "I am just as smart as other kids my age") had an alpha of .70. A seven-item scale indexing peer competence ("I feel that I'm popular with others my own age") had an alpha of .76.

**Peer substance use.** A set of three items asked how many of the participant's friends used cigarettes, alcohol, or marijuana. Each item had a 5-point response scale with anchor points *none of my friends* and *more than three of my friends*. The items were substantially intercorrelated, and prevalence increased over time. A three-item composite score had alphas of .73 and .84 for seventh grade and ninth grade, respectively.

**Participant's substance use.** Substance use by the participant was indexed with items that asked about the typical frequency of his or her cigarette, alcohol, and marijuana use. Three items were introduced with the stem "How often do you smoke cigarettes/drink alcohol/smoke marijuana?" Responses were made on a six-point scale with response points "never used," "used one or two times," "used four or five times," "usually use a few times a month," "usually use a few times a week," and "usually use every day." A fourth item asked the participant if there had been a time in the past month when he or she had had three or more drinks (beer, wine, or liquor) on one occasion; responses were made on a three-point scale

<sup>1</sup> In another study, these measures were assessed together with a measure for perceived availability of parental emotional and instrumental support (from Wills et al., 1992). The correlation of the present parent support measure with the parent support availability measure was  $r = .66$ . This provides evidence for convergent validity.

with response points “no”; “yes, happened once”; and “yes, happened more than once.” These items were intercorrelated (cf. Hays, Widaman, DiMatteo, & Stacy, 1987; Newcomb & Bentler, 1988), and prevalences increased over time; a four-item composite score had alphas of .72 and .82 for seventh-grade and ninth-grade data, respectively.

## Results

Data on prevalence of substance use indicated an appreciable level of use at seventh grade. The proportion of participants who smoked monthly or more often was 6%, and the proportion who had engaged in heavy drinking at least once during the past month was 13%. Rates for marijuana use were lower, with 3% having ever tried marijuana and 1% having used it four times or more. Prevalence rates increased over time; comparable figures for the ninth-grade assessment indicated that 20% of participants smoked monthly or more often, 22% had engaged in heavy drinking at least once during the past month, 21% had tried marijuana at least once, and 12% had used it four times or more. These rates are consistent with data from other studies (Johnston, O’Malley, & Bachman, 1995), although rates of marijuana use tended to be lower. For seventh-grade data, the composite substance use score, with a possible range of 0 to 17, had a mean of 1.44 ( $SD = 2.10$ ), with a skewness of 2.74; comparable figures for ninth-grade data were  $M = 3.21$  ( $SD = 3.76$ ), with a skewness of 1.53.

The support measures had a range of 4 to 20, and descriptive statistics at seventh grade indicated that parent support had a mean of 12.86 ( $SD = 5.18$ ) and peer support had a mean of 12.69 ( $SD = 4.90$ ). Thus, participants reported comparable levels for both types of support. Skewness was low ( $-0.19$  and  $-0.18$ , respectively), but there was a tendency for bimodal distributions, with groups of participants at both upper and lower scores. Data for ninth grade indicated that parent support had a mean of 11.79 ( $SD = 5.27$ ) and peer support had a mean of 12.93 ( $SD = 5.19$ ). The observed decline in parental support during adolescence, and the slight increase in peer-based support, is consistent with other studies (Piko, 2000; Wills & Cleary, 1996). Scores for parent and peer support were positively correlated, with  $r_s = .27$  and  $.31$  for the seventh- and ninth-grade assessments, respectively.

Correlations of support measures with demographics were generally low. The only substantial correlation was for gender and peer support ( $r = -.26$ ,  $p < .0001$ ), indicating that girls had more peer support compared with boys; this effect is comparable to findings from previous research (Windle, 1992). There was an inverse correlation of peer support with African American ethnicity ( $r = -.10$ ,  $p < .0001$ ), but correlations for other demographic characteristics were lower. Although demographic effects were generally modest, subsequent analyses were performed with demographic controls.

### Correlates and Mediation Tests

Because scores for parent and peer support were correlated, relations of the support measures with adolescent substance use were tested in multiple regression. The regression analyses included binary indices for gender, ethnicity (two indices: African American vs. Hispanic or Caucasian and Hispanic vs. African American or Caucasian), family structure (single vs. blended or intact and blended vs. single or intact), and parental education (coded up through high school graduate vs. at least some college).

First, each support measure was entered alone, to indicate zero-order relations with substance use controlling for demographics; then the two support measures were entered simultaneously with the demographic variables. (Results were almost identical with and without demographic controls.) The results, presented in Table 1, showed that parent support was inversely related to substance use, both on a zero-order basis and in a multivariate model. Peer support typically had a nonsignificant zero-order relation with substance use but had a significant effect, with positive sign, in the multivariate model. Similar results were found for tobacco, alcohol, and marijuana use, so effects for support variables were not specific to a particular substance. These results are consistent with previous suggestions of suppression effects for peer support (Windle, 1992) and indicate a replicable positive relation to adolescent substance use.<sup>2</sup>

Analyses examining the relations of the two support measures with other variables, using multiple regression with both support scales entered together, indicated that parent and peer support had somewhat different patterns of correlation. Parent support was positively related to good self-control and inversely related to poor self-control and recent negative events, but peer support was not significantly related to poor self-control or negative events. Parent support was inversely related to risk taking, but peer support tended to be positively related to this construct. Parent support was inversely related to both friend and adolescent substance use, whereas peer support had positive correlations with these variables. These findings are consistent with other studies showing divergent correlates for parent and peer support, with peer support being related to indexes of positive mood but often unrelated to competencies (e.g., in academic performance) and positively related to indices of maladaptive coping, including anger, avoidance, and pessimism (see Wills & Resko, 2004).

The pattern of correlations of parent and peer support with variables related to substance use indicates that testing is appropriate to determine how the effects of support are mediated (Baron & Kenny, 1986). We used standard procedures for mediation testing, first determining the regression coefficient for a support source on substance use when entered alone (hereafter termed the *solo effect*), then determining whether the coefficient was altered when another variable was included in the regression (MacKinnon, 1994). Because of the possibility of multiple mediation, we tabulated instances where the coefficient for a support variable was reduced by at least 1–2 standard errors. (Detailed data are available from the authors.)

Findings on mediation were closely replicated across assessments. Evidence was found suggesting mediation through self-control, risk taking, recent events, and peer substance use. Results were more straightforward for parental support, which had a consistent pattern of being positively correlated with protective factors

<sup>2</sup> We also tested Parent Support  $\times$  Peer Support interactions in multiple regression by entering a cross-product term with the two main effect terms. Although these were consistent in form with previous results (with substance use particularly elevated among cases with low parent and high peer support), significance levels for the interaction term were marginal. Such interactions have been indicated in some studies (Scholte, van Lieshout, & van Aken, 2001; Wills & Vaughan, 1989), but overall this may not be a consistent effect.

Table 1  
Coefficients for Relations of Support Variables With Substance Use Indices

Index/variable	Seventh grade		Ninth grade	
	<i>r</i>	$\beta$	<i>r</i>	$\beta$
Composite score				
Parent support	-.21****	-.24****	-.15****	-.19****
Peer support	.03	.11***	.06*	.13****
Smoking				
Parent support	-.18****	-.21****	-.12****	-.16****
Peer support	.03	.09***	.07**	.13****
Alcohol use				
Parent support	-.17****	-.18****	-.16****	-.20****
Peer support	.00	.05*	.04	.12****
Marijuana use				
Parent support	-.07**	-.08**	-.10***	-.13****
Peer support	-.03	.01	.03	.08***
Heavy drinking				
Parent support	-.10***	-.12****	-.08**	-.11****
Peer support	.04	.08**	.06*	.10***

Note. Values are standardized coefficients from multiple regression analyses with demographic controls, with a substance use index as the criterion variable. *r* is the zero-order relation to substance use,  $\beta$  is the relation in the multiple regression model with both support scales entered simultaneously. Analytic *n* is approximately 1,470 for seventh-grade data and 1,310 for ninth-grade data.

\*  $p < .05$ . \*\*  $p < .01$ . \*\*\*  $p < .001$ . \*\*\*\*  $p < .0001$ .

(e.g., good self-control) and inversely correlated with risk factors (e.g., risk-taking tendency); hence, including most of the risk or protective factors in the regression reduced the coefficient for parental support. Results for peer support were more variable, and there was some evidence for suppression effects, with the coefficient for support being increased when other variables (e.g., good self-control) were added to the regression. Again, this indicates complex effects for peer support.

### Structural Modeling Analysis of Mediation Process

Because of the evidence for mediated effects, we analyzed pathways from support to substance use in structural equation modeling. Demographic variables were included in the model as manifest variables, each having a single indicator. The measurement model was specified with latent constructs for parent and peer support, each having four items as indicators (cf. Newcomb & Bentler, 1988). Good self-control was specified as a latent construct measured by indicators of dependability, planfulness, and problem solving; poor self-control was specified as a latent construct measured by indicators of impatience, distractibility, and angerability.<sup>3</sup> Risk-taking tendency was specified as a latent construct measured by the risk-taking items. Recent negative events was a latent construct measured by three random parcels of items; recent academic positive events was a latent construct based on the two academic items; and recent social positive events was a latent construct based on the two social items.<sup>4</sup> Peer substance use was a latent construct measured by indicators of friends' tobacco, alcohol, and marijuana use, and adolescent substance use was a latent construct measured by indicators of tobacco use, alcohol

use, marijuana use, and heavy drinking (cf. Hays et al., 1987; Wills et al., 1998).

Confirmatory analysis was performed to test the measurement model described above and determine the bivariate correlations among the constructs. Reduction in the analytic sample sizes occurred largely because of excluding cases with mixed or other ethnicity. In seventh grade, there were 1,502 cases who met demographic criteria, and 1,396 of these had complete predictor data; in ninth grade, there were 1,327 cases who met demographic criteria, and 1,271 of these had complete predictor data. The confirmatory model was analyzed in Mplus Version 2.02 (Muthén & Muthén, 1998) using the maximum likelihood method for a sample with complete data. The model for seventh grade had good fit to the data, with  $\chi^2(452, N = 1,396) = 1137.39$ , comparative fit index (CFI) = .96, and root-mean-square error of approximation (RMSEA) = .033, 90% confidence interval (CI) = .031–.035. Similar good fit was noted for the ninth-grade model,  $\chi^2(453, N = 1,271) = 1165.95$ , CFI = .96, and RMSEA = .035 (CI = .033–.038). The measurement model was satisfactory, with indicators having generally high loadings on constructs (see Table 2). Construct correlations (see Table 3) indicated the differential patterning of correlates for parent and peer support. The correlations of variables were consistent with the hypothesized mediation process: Self-control constructs had reasonable correlations with recent events, events had sizable correlations with peer substance use, and peer use had a substantial correlation with adolescent substance use.

To test the hypotheses about mediational pathways for support, we analyzed a structural model with the parent and peer support constructs specified as exogenous (i.e., not predicted by any prior construct in the model). The support constructs were specified together with demographic indexes, both to control for any correlations with demographics and to obtain evidence on pathways for demographic characteristics. Endogenous variables (i.e., those that could be predicted by a prior construct in the model) were specified subsequent to the support constructs. Good self-control, poor self-control, and risk-taking tendency were specified as the first set of endogenous variables; these constructs were specified with covariances of their residual terms. The three recent-events measures were specified subsequent to these, also with covariances of their residual terms. Peer use was specified immediately proximal to the criterion construct, adolescent substance use.

<sup>3</sup> Tests for the self-control constructs were based on nine indicators, and a nested analysis compared a two-factor model with a one-factor model. (Measures for cognitive coping, avoidant coping, and helpless coping did not have high loadings on the constructs and therefore were not included in the final analysis.) For the nested analysis, the difference chi-square (1 *df*) was 898.59 for seventh-grade data and was 737.35 for ninth-grade data, both tests indicating marked superiority for a two-factor model. Developmental theory has suggested that good self-control and poor self-control are distinct constructs, with different antecedents and consequences (Rothbart & Bates, 1998; Wills, Sandy, & Yaeger, 2000), and this view of self-control has been supported by other studies in addition to the present analyses (Wills, Sandy, & Yaeger, 2000; Wills & Stoolmiller, 2002).

<sup>4</sup> Where possible, it is desirable to have at least three indicators for a latent construct (Hoyle, 1995). Some of the measures in the present study had only two items, but these had reasonably high loadings on the latent constructs.

Table 2  
Measurement Model Parameters in Confirmatory Analysis

Construct	Seventh grade	Ninth grade
Parent support		
Item 1	.85	.87
Item 2	.76	.77
Item 3	.70	.79
Item 4	.89	.89
Peer support		
Item 1	.83	.86
Item 2	.77	.86
Item 3	.69	.84
Item 4	.85	.89
Good self-control		
Dependability	.74	.68
Planfulness	.74	.76
Problem solving	.75	.73
Poor self-control		
Impatience	.54	.53
Distractibility	.71	.71
Angerability	.74	.73
Risk taking		
Item 1	.78	.83
Item 2	.80	.84
Negative events		
Parcel 1	.75	.81
Parcel 2	.67	.79
Parcel 3	.81	.72
Academic positive events		
Item 1	.64	.61
Item 2	.47	.54
Social positive events		
Item 1	.76	.75
Item 2	.78	.71
Friends' substance use		
Smoking	.68	.75
Alcohol	.89	.89
Marijuana	.55	.75
Adolescent substance use		
Cigarette use	.66	.68
Alcohol use	.75	.86
Marijuana use	.43	.62
Heavy drinking	.56	.71

Note. All values are standardized coefficients, that is, factor loadings.

We analyzed the structural model in Mplus through first estimating a model with a minimum set of predicted paths (Wills, Sandy, & Yaeger, 2000). Paths for support measures and other exogenous variables were included if they had modification indices  $>12$  (approximately  $p < .01$ ). Endogenous structural coefficients were introduced if they had modification indices  $>25$  ( $p < .0001$ ), and correlated errors were included on the basis of the same criterion. The final structural model for seventh grade with eight correlated errors had reasonable fit to the data,  $\chi^2(501, N = 1,396) = 1274.51$ , CFI = .95, RMSEA = .033 (CI = .031–.036). The structural model for ninth-grade data with seven correlated errors also had good fit,  $\chi^2(505, N = 1,271) = 1299.40$ , CFI = .96, RMSEA = .035 (CI = .033–.038). The results are presented in Figure 1 and Figure 2.<sup>5</sup> Correlations among the exogenous variables, and residual covariances for endogenous constructs, which were included in the models but are excluded from the figures for graphical simplicity, are presented in Tables 3 and 4. The exogenous variables accounted for reasonable amounts of

variance in mediator constructs of self-control and risk taking (10%–25%). Together, the variables in the model accounted for 51% of the variance in adolescent substance use for seventh-grade data and 46% of the variance for ninth-grade data. We note that the criterion construct was skewed, and although skewness does not appreciably bias structural coefficients, standard errors may be underestimated (Hoyle, 1995). The models were analyzed using robust standard errors, and all the paths reported here were significant ( $p < .05$ ) with robust standard errors.

Results indicated that effects of support were largely mediated through pathways to self-control and risk-taking tendency. (Note that the findings reported here are all independent effects.) Parent support had a positive path to good self-control, an inverse path to poor self-control, and an inverse path to risk taking; it also had a direct effect to social positive events and, in seventh grade, an inverse direct effect to adolescent substance use. Peer support had a positive path to good self-control, a positive path to poor self-control, and a positive path to risk taking; it also had a direct effect, with positive sign, to peer substance use. The paths for parent support all represent protective effects, but the paths for peer support represent a mix of protective and risk-promoting effects.

Effects for the mediating constructs were such that good self-control had paths to positive events, both academic and social. Poor self-control had (in order of magnitude) a path with positive sign to negative events, an inverse path to academic positive events, and a path with positive sign to social positive events. The last path may be a consequence of extroverted and impulsive individuals having more of both types of events (cf. Emmons & Diener, 1986). Risk taking had a direct effect on affiliation with peer substance users, which may represent a process of social niche picking (Scarr, 1992), and also had a direct effect on substance use, which may represent a proclivity for risky activities (Maggs et al., 1995).

Pathways to substance use involved both direct and indirect effects. Positive academic events had an inverse direct effect to substance use (significant in ninth grade but not in seventh grade), whereas positive social events had an inverse path to affiliation with substance-using peers. Negative events had an indirect effect on substance use through a path to affiliation with substance-using peers, replicating a pathway previously observed for major life events (Wills et al., 1998). Peer substance use had a large path to adolescent substance use, consistent with a proximal factor (Wills & Cleary, 1999).

We tested the total indirect effect for the two support measures through all the pathways they had in the model. For the seventh-grade model (see Figure 1), the total indirect effect for parental support was significant and inverse in sign,  $t = -9.06$ ,  $p < .0001$ , whereas the total indirect effect for peer support was significant and positive in sign,  $t = 4.19$ ,  $p < .0001$ . Similar results were found for the ninth-grade model (see Figure 2), with an inverse indirect effect for parental support,  $t = -9.63$ ,  $p < .0001$ , and a positive indirect effect for peer support,  $t = 3.72$ ,  $p < .001$ . Thus,

<sup>5</sup> The structural model included five demographic indexes because of missing data on parental education. The structural models were replicated with parental education included, and results were quite similar. The only effect noted for parental education was a direct effect to peer use ( $\beta = -.09$ ,  $p < .01$ ).

Table 3  
Correlations of Model Constructs From Confirmatory Analysis

Construct	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Parent support	—	.34	.08	-.01	.00	.00	-.06	.46	-.30	-.18	.32	.18	-.28	-.18	-.20
2. Peer support	.31	—	-.31	-.06	-.07	-.09	-.02	.33	-.07	.08	.20	.12	-.05	.08	.09
3. Male	.03	-.29	—	.01	.06	.00	-.01	-.02	.04	.24	-.04	.00	.00	-.11	-.07
4. Black	-.03	-.12	-.01	—	-.46	.26	.04	.03	.00	-.08	.05	.11	.06	-.11	-.11
5. Hispanic	-.03	.04	.04	-.39	—	.01	.04	.00	.01	.01	-.10	.06	.05	.06	-.02
6. Single parent	-.02	-.07	-.03	.25	.01	—	-.28	-.04	.02	.02	-.09	.06	.05	.00	-.01
7. Blended family	-.02	.03	.00	.04	.05	-.26	—	-.04	.06	.02	-.05	-.03	.07	.02	.08
8. Good self-control	.47	.33	-.06	-.02	.02	-.08	.00	—	-.58	-.26	.56	.17	-.34	-.18	-.26
9. Poor self-control	-.33	-.01	.11	.10	.01	.13	.01	-.43	—	.56	-.56	.02	.67	.37	.44
10. Risk taking	-.16	.03	.28	.02	-.03	.05	.02	-.22	.53	—	-.27	-.03	.39	.33	.39
11. Academic positive events	.28	.10	-.01	.00	-.20	-.12	.01	.49	-.44	-.18	—	.22	-.41	-.28	-.33
12. Social positive events	.18	.09	.06	.12	.07	.05	.04	.19	.06	.02	.08	—	.39	-.07	-.07
13. Negative events	-.19	-.05	.20	.12	.08	.10	.08	-.27	.68	.34	-.39	.57	—	.32	.33
14. Peer substance use	-.15	.05	.01	.09	.07	.11	.08	-.18	.34	.29	-.20	-.03	.29	—	.62
15. Adolescent substance use	-.24	.03	.04	-.04	.04	.10	.05	-.25	.34	.39	-.23	-.16	.25	.65	—

Note. Data for the seventh grade are below the diagonal, and data for the ninth grade are above the diagonal. The analysis has  $N = 1,396$  for seventh-grade data and  $N = 1,271$  for ninth-grade data.

the overall effect for parental support was a protective one. The overall effect for peer support, considering the different types of pathways involved for this variable, was a risk-promoting one.

Effects for demographic variables were such that male gender had largely risk-promoting effects through paths to poor self-control and risk-taking tendency, and (in seventh grade) a direct effect to negative events; however, a direct effect to peer use indicated that girls had more friends who used substances. Both African American ethnicity and Hispanic ethnicity had inverse direct effects on substance use. The latter findings are consistent with previous data showing lower rates of substance use among African American adolescents (e.g., Bachman et al., 1991; Maddahian, Newcomb, & Bentler, 1988; Vega, Zimmerman, Warheit, Apospori, & Gil, 1993) but also indicate that these protective effects did not occur through any of the variables in the model. Effects for family structure were less consistent, but paths to poor control and negative events were found.

We examined ethnic and gender differences in effects of support through testing Support  $\times$  Predictor interactions in multiple regression, using the demographic indexes described previously and with adolescent substance use score as the criterion. No significant interactions were observed for gender or ethnicity at either assessment, so we did not perform structural modeling analyses to test for subgroup differences, as there is reason to believe that the overall support processes represented in Figures 1 and 2 are similar across gender and ethnic groups.

The participants could be linked over time, and so prospective analyses were possible. Prospective tests for the support measures were performed in multiple regression, predicting substance use at Grade 9 from support measures at Grade 7, with control for substance use at Grade 7.<sup>6</sup> A combined model indicated that parent support was inversely related to change in adolescent substance use ( $\beta = -.08$ ),  $t = 2.62$ ,  $p < .01$ , and peer support was positively related to change in adolescent substance use ( $\beta = .08$ ),  $t = 2.94$ ,  $p < .01$ , so the overall effects of parent and peer support operate on a longitudinal basis. We used prospective regression to test the relationships specified in the structural analysis, using the generic regression model (consequent at Grade 9) = (predictor at Grade

7 + consequent at Grade 7). Results indicated that 14 of the 18 replicated paths (aside from demographics) were significant ( $p < .05$ ) in prospective regression. (Two were significant at  $p < .10$ .) For example, parent support was positively related to change in good self-control and inversely related to change in risk taking, poor self-control was positively related to change in negative events and was inversely related to change in academic positive events, social positive events were inversely related to change in peer substance use, negative events were positively related to change in peer substance use, and peer substance use was positively related to change in adolescent substance use. Thus, paths noted in the cross-sectional structural models also occur on a longitudinal basis.<sup>7</sup>

## Discussion

The purpose of this research was to clarify the roles of parent support and peer support for adolescent substance use. The data were obtained from a large representative sample of adolescents, and the two support measures tapped similar functions of confiding and emotional support, with only the source of support being different across measures. Results showed significant effects for both types of support, which were generally consistent with previous studies that utilized several different support measures (Lifrak et al., 1997; Piko, 2000; Windle, 1992). Parent support was inversely related to substance use, peer support was positively related to substance use, and analyses established that the positive

<sup>6</sup> The 2-year retention rate of cases was approximately 65%. There was some evidence of differential attrition, as found in previous research with adolescents (e.g., Newcomb & Bentler, 1988; Wills, McNamara, Vaccaro, & Hirky, 1996), with slightly greater attrition for more deviance-prone students, but the magnitude of effects was relatively small, and the nature of the attrition would work against finding significant effects for substance use.

<sup>7</sup> A complete longitudinal test of the mediational model would require five-wave longitudinal data, so the present research focused on analyzing replicated effects from two different assessments.

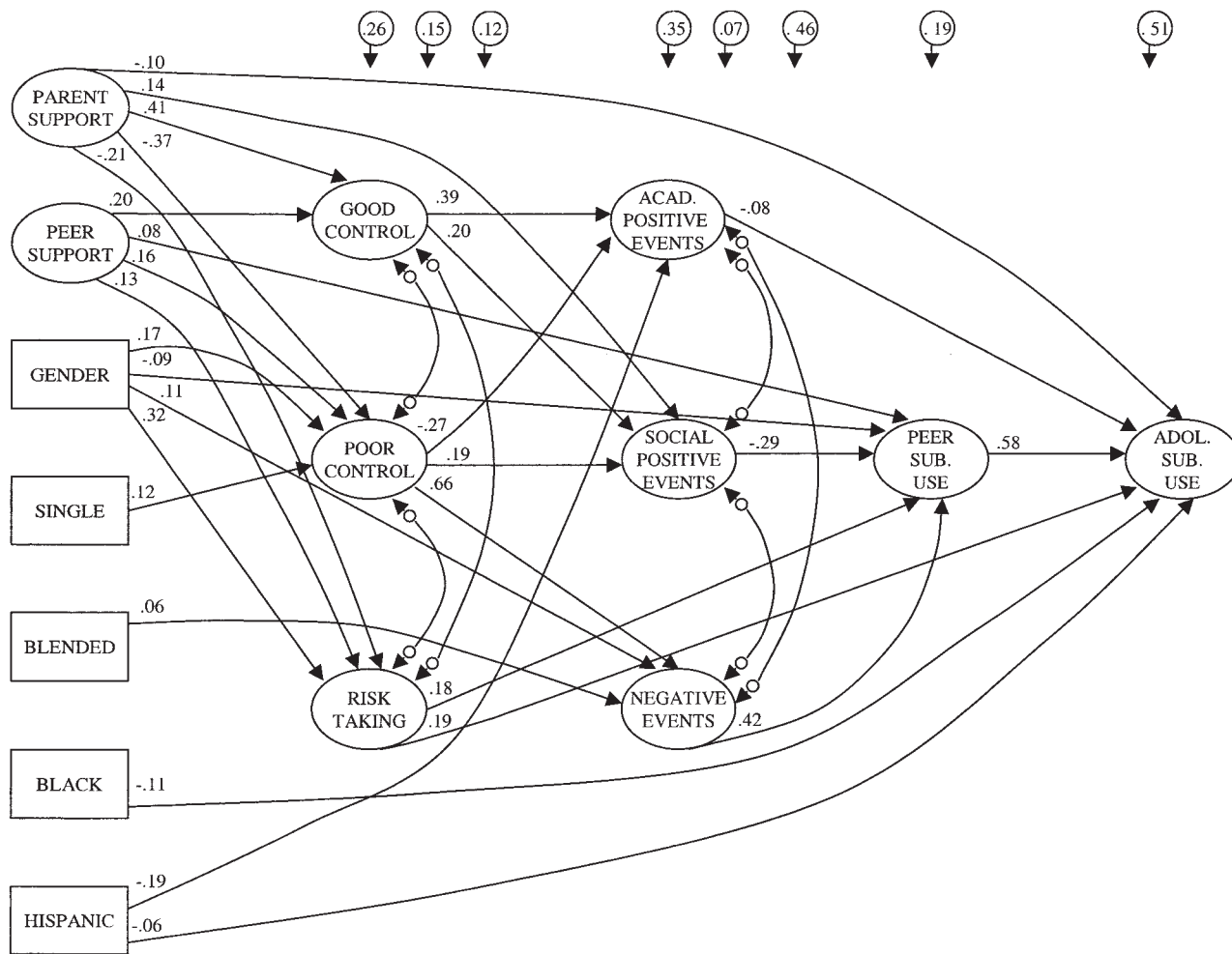


Figure 1. Structural model for the relation of parent support and peer support to adolescent (ADOL.) substance (SUB.) use, for seventh-grade data. Curved double-headed arrows indicate covariances, and straight single-headed arrows indicate path coefficients. All values are standardized coefficients. All coefficients in the figure are significant; approximate significance levels are  $\beta = |.06|, p < .05$ ;  $\beta = |.08|, p < .01$ ;  $\beta = |.10|, p < .001$ ;  $\beta = |.12|, p < .0001$ . Measurement-model indicators and parameters are presented in Table 2. Included in the model but not included in the figure, for graphical simplicity, are covariances of exogenous variables and covariances of error terms for endogenous constructs (see Tables 3 and 4). Values in circles at the top of the figure are squared multiple correlations, the variance explained in a given construct by all constructs to the left of it. ACAD. = academic.

relation of peer support to substance use represented a suppression effect. The opposite effects of parent and peer support were replicated for two ages, early adolescence and middle adolescence, and the findings were independent of demographic characteristics, including gender and ethnicity.

The present research explored the correlates of parent and peer support and found some notable differences. Parent support shows a consistent pattern of being positively related to variables recognized as protective factors and inversely related to variables recognized as risk factors (Hawkins, Catalano, & Miller, 1992). Peer support had a complex pattern of correlates; it was positively correlated with good self-control but was not inversely related to most risk factors, and sometimes it was positively correlated with them. This complex pattern of correlates helps explain the nature

of the suppressed effects: Peer support is positively related to some variables that are inversely related to substance use and to some variables that are positively related to substance use. These properties are balanced enough to sometimes cancel out and produce nonsignificant zero-order correlations, but when variables correlated with peer support are included in a multivariate model, then the positive relation of peer support with substance use is more accurately represented (Tzelgov & Henik, 1991).

We hypothesized that the relation of support to substance use would be mediated through other variables, and the results were largely consistent with this prediction. Relations to self-control and risk taking were the primary pathways for both parent and peer support, with different paths for the two types of support. The second part of the mediation process involved indirect effects for

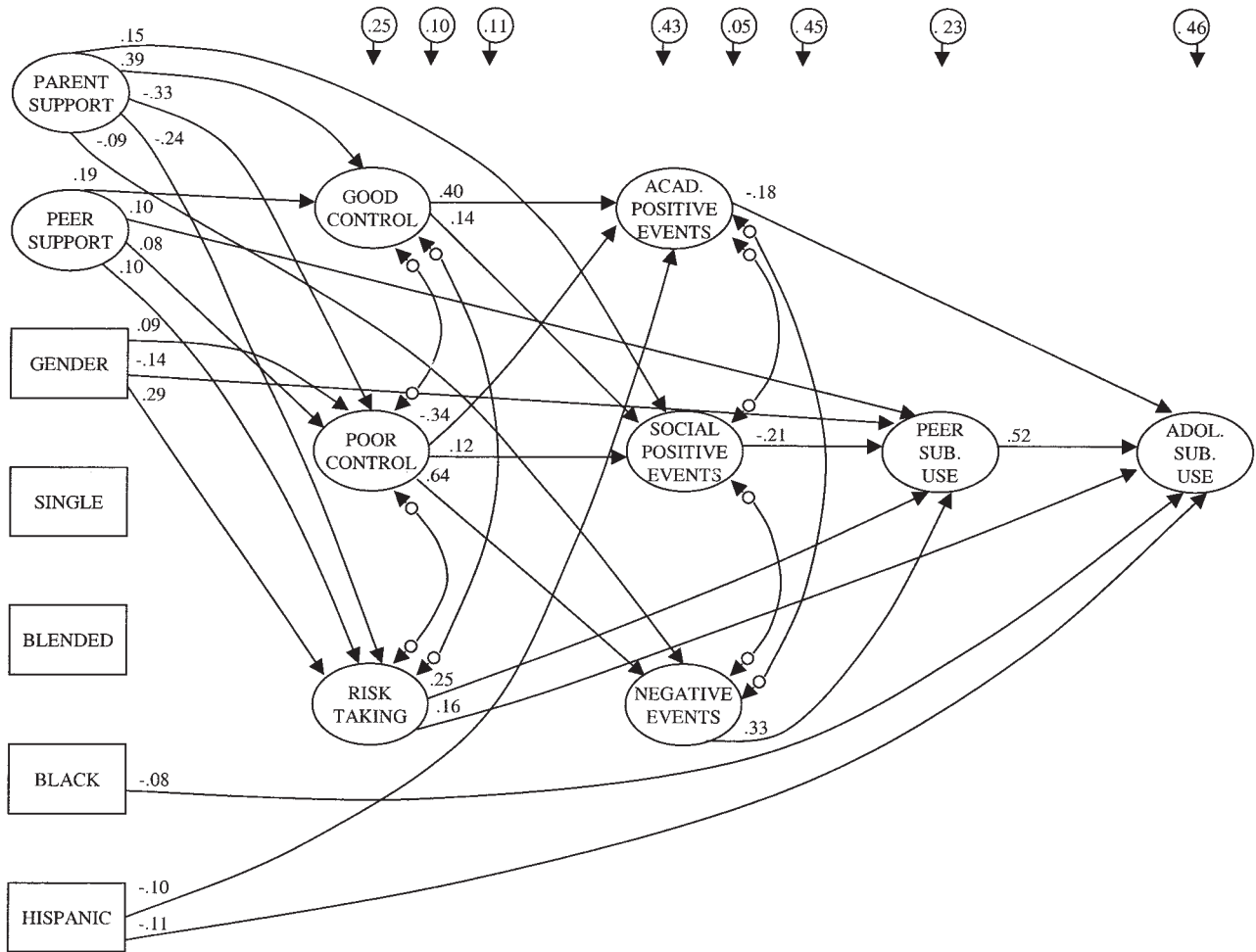


Figure 2. Structural model for the relation of parent support and peer support to adolescent (ADOL.) substance (SUB.) use, for ninth-grade data. Curved double-headed arrows indicate covariances, and straight single-headed arrows indicate path coefficients. All values are standardized coefficients. All coefficients in the figure are significant; approximate significance levels are  $\beta = |.06|, p < .05$ ;  $\beta = |.08|, p < .01$ ;  $\beta = |.10|, p < .001$ ;  $\beta = |.12|, p < .0001$ . ACAD. = academic.

Table 4  
Residual Covariances for Endogenous Constructs in the Structural Model

Construct	1	2	3
1. Good self-control	—	-.43	-.17
2. Poor self-control	-.28	—	.49
3. Risk taking	-.14	.40	—
1. Negative events	—	-.05	.41
2. Academic positive events	-.09	—	.15
3. Social positive events	.52	.05	—

Note. Values are standardized coefficients, that is, correlations. Data for the seventh grade are below the diagonal, and data for the ninth grade are above the diagonal.

self-control constructs through paths to recent events, whereas risk taking had direct effects to peer use and adolescent substance use.

A direct effect from parental support to adolescent substance use was found only in early adolescence. The difference between the seventh-grade and ninth-grade models may reflect a developmental trend of less involvement with family and more involvement with peers (Brown et al., 1997; Wills & Cleary, 1996). However, it should be noted that parent support was still quite important in middle adolescence, and other studies show that parental support remains important from early childhood (Dubow & Tisak, 1989) into young adulthood (Fondacaro & Heller, 1983).

The results indicated that risk-taking tendency made a significant contribution to early substance use, involving both direct and indirect effects. This finding seems noteworthy in light of the fact that risk taking was indexed with a scale having only two items, yet this measure had a substantial direct effect to substance use as well as an indirect effect through deviant peer affiliations. Risk taking may be rooted in temperament attributes in addition to being influenced by socialization factors (Cloninger, Svrakic, &

Pryzbeck, 1993; Wills, Sandy, & Yaeger, 2000), so understanding the origin and consequences of risk-taking tendency is a topic of theoretical interest.

The present research examined pathways for positive and negative events that occur on an everyday basis (also known as *daily hassles*; L. Cohen, 1988; Compas, Malcarne, & Banez, 1992). Significant results were found both for positive events and negative events. The path from recent negative events to deviant peer affiliations replicates paths previously found for major life events (Castro, Maddahian, Newcomb, & Bentler, 1987; Wills, Sandy, & Shinar, 1999) and also extends this to a daily basis. Positive events have been less studied in substance use research (cf. S. Cohen & Hoberman, 1983), but we found suggestive evidence of a protective role for two types of events, involving different pathways for positive academic events and positive social events. Such measures may have utility for program evaluation as well as etiological research, and the present results provide evidence for the possible usefulness of this approach.

A methodological implication of this research bears on procedures for mediation testing. Standard procedures for mediation (Baron & Kenny, 1986) are designed for situations in which predictors, mediators, and outcomes are correlated in a consistent manner, as was the case for parent support in the present data. Suppression situations also may occur in adolescent research (MacKinnon, Krull, & Lockwood, 2000), but this has received less attention, and suppression was definitely the case for peer support in the present research. The mediation testing did not clearly identify many apparent mediation effects for peer support, even though significant pathways were evident in the structural modeling analyses. The probable explanation is that peer support has positive correlations with both risk and protective factors, and this may operate to mask true effects in typical mediation testing procedures. This draws attention to a need to explore mediation testing procedures for suppression situations (cf. MacKinnon et al., 2001).

Some aspects of this research could be noted as possible limitations. The parent and peer support measures indexed one aspect of support relationships—support seeking—and further research testing different dimensions of social support is warranted (Wills & Shinar, 2000). The inventory of positive events was based on descriptive research and had relatively few items; hence, research on different types of positive events in adolescence would be useful. The present research, like previous studies based on individual coping and self-control theory (Wills et al., 1999), was more successful in accounting for variance in life events and less successful in accounting for variance in variables such as peer affiliations. Further research may direct attention to environmental variables, which may explain additional variance in social factors (Krohn & Thornberry, 1993; Leventhal & Brooks-Gunn, 2000). Finally, the directionality of relations between constructs needs to be explored in research with multiwave samples using techniques such as growth curve modeling (e.g., Curran, Stice, & Chassin, 1997; Wills & Cleary, 1999).

#### *How Does Parental Support Operate?*

The present results were consistent with previous findings in showing parental support to be a protective factor for substance use (Barrera et al., 1993; Wills et al., 1992). This research provided

evidence that effects of parental support are mediated through relations to self-control ability of adolescents; such a process was implied in findings from Wills and Cleary (1996), but that study lacked extensive direct measures of self-control. Theoretical formulations of adolescent risk behavior have generally suggested that good parent–child relationships are protective because they promote bonding to conventional values (Jessor & Jessor, 1977), and there is evidence that parental support is related to less deviance-prone attitudes (Wills & Cleary, 1996). However, the present findings of pathways through self-control suggest a somewhat different perspective, because the effect sizes were considerable and indicate that the role of parental support for promoting adolescents' competence and self-control is a significant part of the protective process (Wills, Blechman, & McNamara, 1996; Wills, Gibbons, et al., 2000).

Supportive relationships may be related to self-control in part because of an influence in promoting general socialization processes (Rothbart & Ahadi, 1994). Parents can help children learn self-control skills through modeling of problem-solving behavior and through direct instruction in anticipating and dealing with problem situations (Brody & Flor, 1998; Kochanska, Murray, & Harlan, 2000). Motivational support may be provided through encouraging children to persist in dealing with tasks and solving problems (Steinberg, Lamborn, Dornbusch, & Darling, 1992; Wills, 1991) and hence build this aspect of self-regulation (Carver & Scheier, 2000). In addition, parents may help children to learn strategies for emotion regulation that will be part of an effective self-control repertoire (Southam-Gerow & Kendall, 2002). It should be noted at the same time that parent–child similarities may have contributions from shared constitutional attributes, and this issue should be recognized in theoretical perspectives on self-control development (Rutter et al., 1997).

#### *How Does Peer Support Operate?*

The complex effects of peer support probably derive from a combination of processes. In the present data, the positive correlation of parent and peer support measures suggests a general tendency to seek support from social relationships, a concept outlined in Cloninger et al.'s (1993) theory, where it is termed *social reward dependence*. Susceptibility to social rewards may be related to self-control, as suggested by Rothbart and Ahadi (1994), because individuals with reliance on social relationships could receive more social reinforcement for being dependable and working cooperatively with others on tasks (Steinberg, Dornbusch, & Brown, 1992).

It should be recognized, however, that the values endorsed in peer groups may not be exactly the same as those held by parents, and they can be substantially different (Wills & Resko, 2004). To some extent, peers may encourage (or at least not discourage) impulsive behavior and risk-taking actions, and their attitudes toward substance use tend, on average, to be more than positive, hence parents' greater support from peer groups could increase the impact of these processes. When a general tendency for support seeking is partialled, these unique effects of peer groups become evident in a positive relation to substance use. Whether this occurs through cognitive mechanisms, such as perceiving a greater prevalence of peer tobacco and alcohol use (Sussman et al., 1988, 1994), having more positive images of typical peer users (Blanton

et al., 1997; Gibbons & Gerrard, 1997), or through direct encouragement to use substances, is not known, and this issue needs to be clarified in further research.

### Implications for Prevention

The relation of parental support to adolescents' self-control ability, and the effects noted for self-control in the present data, have several implications for prevention research. The substantial effects of self-control on recent positive and negative events, which contribute in either protective or risk-promoting ways to deviant peer affiliations, suggest a focus for prevention studies in which efforts are made to modify self-control so as to promote exposure to a more protective profile of events. This includes not just aiming to reduce levels of negative events but also to increase levels of positive events, because positive types of events were suggested in the present data as having a substantial protective role in the substance use process.

The findings also help to clarify the nature of gender differences. The prevalence of substance use, particularly heavy drinking and illicit drug use, tends to be greater among adolescent males, but the reasons for this risk status are not well understood (Johnston et al., 1995). Although gender differences in alcohol use may in part be linked to physiological differences in effects of alcohol (Windle, 1999), the present data indicate that male gender was related not only to poor self-control but also to greater risk-taking tendency. Thus, gender differences may also be attributable to differences in psychosocial variables. These effects have implications for preventive interventions that give specific attention to the risk status of young males.

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