

Ecological Predictors of Substance Use in Middle School Students

Shannon M. Suldo, Stephanie Mihalas, Heather Powell, and Rachel French
University of South Florida

The current study examined important predictors of substance use during early adolescence. The authors hypothesized that adolescents' relationships with key adults (i.e., teachers and parents) influence their choices to use substances indirectly through links with their decisions regarding peer groups. A total of 461 middle school students from an affluent suburban community completed self-report measures of authoritative parenting, perceived social support from teachers, affiliation with rule-breaking and substance-using peers, and frequency of alcohol, cigarette, and drug use. Results of structural equation modeling supported the hypothesized model. Authoritative parenting and teacher support accounted for 31% of the variance in affiliation with deviant peers which, in turn, accounted for 27% of the variance in adolescent substance use; direct paths from parenting and teacher support to substance use were not indicated. Implications for school psychologists' involvement in substance use prevention and intervention are discussed.

Keywords: substance use, authoritative parenting, teacher support, deviant peers, adolescence

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In addition to posing clear risks to physical and mental health (Johnston, O'Malley, Bachman, & Schulenberg, 2004), the use of alcohol, tobacco, and other illicit substances impedes optimal academic functioning in school-aged children and adolescents (Engberg & Morral, 2006; Hishinuma et al., 2006). More efficient than intervening with

individual substance abusers, school psychologists can combat substance use by disseminating information pertinent to prevention and facilitating systems-level programs that are based on empirical research. The current study illustrates important predictors of substance use in early adolescents, knowledge essential to the creation of proactive strategies, and interventions to deter the onset of substance use during youth.

Shannon Suldo, PhD, is an assistant professor in the School Psychology Program at the University of South Florida. Her current research interests include subjective well-being during youth and the social-emotional functioning of adolescents in college preparatory programs. Her applied interests pertain to school-based mental health services, including strengths-based assessment and intervention, as well as universal strategies and targeted interventions to improve students' life satisfaction. She received her PhD in School Psychology from the University of South Carolina in 2004. The School Psychology Program at the University of South Florida is accredited by the APA.

Stephanie Mihalas, MA, is a doctoral candidate in the School Psychology Program at the University of South Florida. She is currently completing a predoctoral internship program at the Kennedy Krieger Institute/Johns Hopkins University School of Medicine. Her clinical and research interests include improving the mental health of urban minority youth and understanding relational victimization among early adolescents. The School Psychology Program at the University of South Florida is accredited by the APA.

Heather Powell, PhD, is a Postdoctoral Fellow in the

Division of Child and Adolescent Psychiatry at the Johns Hopkins Hospital. Her clinical and research interests pertain to neuropsychological assessment and the emotional and behavioral correlates of chronic medical conditions during youth, including the impact of these conditions on students' educational outcomes. She received her PhD in School Psychology from the University of South Florida in 2007. The School Psychology Program at the University of South Florida is accredited by the APA.

Rachel French, MA, is a doctoral candidate in the School Psychology Program at the University of South Florida. She is currently completing a predoctoral internship in Hillsborough County Public Schools. Her research interests include adolescent psychology and the impact of pediatric sleep disorders on academic performance and behavior. The School Psychology Program at the University of South Florida is accredited by the APA.

Correspondence concerning this article should be addressed to Shannon Suldo, Department of Psychological and Social Foundations, University of South Florida, 4202 East Fowler Avenue, EDU 162, Tampa, FL 33620. E-mail: suldo@coedu.usf.edu

Impact of Substance Use on Academic Achievement

Substance use is negatively associated with attitudes and beliefs that are predictive of academic success, including interest in school, motivation to achieve, effort expended at school, and feelings of bonding with school (Bryant, Schulenberg, O'Malley, Bachman, & Johnston, 2003; Zimmerman & Schmeelk-Cone, 2003). Substance use also results in reduced exposure to academic opportunities due to attendance problems. For instance, common disciplinary actions for using drugs at school include short-term suspension (Scott & Friedli, 2002). In addition, treatment of substance use disorders often entails residential treatment programs or short-term hospitalizations, both of which remove students from their learning environments. Such absences can be lengthy, as longer treatment time is significantly related to lower drug use following treatment (Hser, Grella, & Hubbard, 2001). Ultimately, substance use co-occurs with diminished academic achievement, as indicated by poor grades (Luthar & Ansary, 2005; McGarvey, Canterbury, Cohn, & Clavet, 1996), fewer intentions to seek higher education (Ellickson, Tucker, Klein, & Saner, 2004), and failure to complete high school (Zimmerman & Schmeelk-Cone, 2003).

Attention to Substance Use in School Psychology Research

Despite the negative impact of substance use on children's development, the topic has received comparatively little attention in empirical literature and professional development conferences geared toward school psychologists. For instance, an electronic review of the content of all manuscripts published in the six journals specific to school psychology¹ during the last 10 years (specifically, 1997 through 2007) yielded only 16 articles that focused on substance use among children and adolescents; of these, eight were contained in a single issue of *School Psychology International*—a special issue devoted to substance use prevention (Kingery, 1999). In addition, a review of the program manuals of the annual conventions held by the National Association of School Psychologists (NASP) since 2001 revealed only 13 presentations that discussed substance use in youth. Notably, there

were no repeat authors, suggesting that few school psychologists dedicate a significant portion of their research agenda to this issue.

Predictors of Substance Use

Despite the paucity of attention within the school psychology literature, an abundance of studies published in other disciplines of psychology (e.g., developmental, clinical, experimental) have explored substance use by identifying factors that predict initial and/or increased use during youth. Predictors identified most frequently and reliably include disadvantageous parenting practices and affiliation with deviant, rule-breaking peers (e.g., Mounts & Steinberg, 1995; Walker-Barnes & Mason, 2004). Less consideration has been given to school-related variables, with the exception of academic achievement (e.g., Hawkins, Catalano, & Miller, 1992).

Influence of parents. One of the strongest predictors of delinquency and antisocial behavior in adolescence is inadequate parenting characterized by inconsistent discipline practices and a general lack of involvement (Jacob & Johnson, 1997). Authoritative parenting, a style of child rearing consisting of high levels of supervision and support, coupled with developmentally appropriate promotion of autonomy in decision making, seems to be the most effective approach to decreasing substance use by adolescents. Adolescents who perceive parents as authoritative tend to experiment with fewer types of illicit substances and also use these substances less frequently (Adamczyk-Robinette, Fletcher, & Wright, 2002; Cleveland, Gibbons, Gerrard, Pomery, & Brody, 2005; Fletcher & Jefferies, 1999).

Influence of peers. Deviant peers act as a mediator between parenting and substance abuse (Pilgrim, Schulenberg, O'Malley, Bachman, & Johnston, 2006; Sale, Sambrano, Springer, & Turner, 2003). For instance, parents who use harsh and inconsistent discipline practices evoke noncompliant and aggressive behaviors from their children, which increases the

¹ Journals selected for review include the *Journal of Applied School Psychology*, *Journal of School Psychology*, *Psychology in the Schools*, *School Psychology International*, *School Psychology Quarterly*, and *School Psychology Review*.

likelihood that they will experience rejection from prosocial peers. Consequently, children from these types of homes may be more likely to associate with deviant drug-abusing peers, as such peer groups may be more accepting of non-normative behavior. Indeed, empirical research confirms that affiliations with deviant peers co-occur with and are predicted by harsh and inconsistent parenting, parent-child conflict, and low maternal emotional responsiveness, in addition to being inversely related to parenting characterized by warmth and involvement (Brody et al., 2001; Fergusson & Horwood, 1999).

Association with deviant peer networks is directly linked to adolescent substance abuse via peer selection and socialization (Aseltine, 1995). Peer socialization theories posit that adolescents who associate with peers who model and reinforce drug use typically have patterns of early and escalating drug use (Piko, 2006). Peer selection theories contend that adolescents seek out peer groups who support and exhibit similar beliefs and practices related to drug use (Martino, Collins, Ellickson, Schell, & McCaffrey, 2006). Thus, peer socialization identifies friends as the main reason for drug use, whereby in a selection theory drug use dictates the selection of friends. Reciprocal influences likely exist to account for the high correlations between reported drug use rates in self-identified peer networks. Regardless of the mechanism by which it works, peer deviance is one of the largest risk factors for drug use (Svensson, 2000; van den Bree & Pickworth, 2005).

Influence of school. Aside from academic achievement, students' attitudes toward school (e.g., school bonding, interest in school, perceived usefulness of academics) have been found to be inversely associated with concurrent and future rates of substance use (Bryant et al., 2003; Zimmerman & Schmeelk-Cone, 2003). In contrast to the sizable body of literature on the role of parents in teenage substance use, relatively few studies have investigated the role of other important adults, such as teachers, in influencing adolescents' choices to use illicit substances. Of the few studies investigating the role of teachers in adolescent substance use, results suggest that teacher supportiveness and high teacher expectations are related to infrequent use of substances (Lifrak, McKay, Rostain, & Alterman, 1997; Suldo, Hardesty, Mi-

halas, Powell, & Witte, 2005) and that students who report troubled relationships with school personnel are more likely to use tobacco, marijuana, and other substances (van den Bree & Pickworth, 2005). Additional research is needed to determine the relative importance of positive relationships with school personnel, specifically teachers, in preventing substance use.

Limitations of Extant Literature

While the general body of research on substance use is extensive, few studies have focused on school-related predictors. One specific school-related factor in need of additional research attention is teacher support, given that mentors and positive adult role models have already been implicated in the pathways to substance use (Rhodes, Reddy, & Grossman, 2005). Another limitation of the current literature base is that relationships among important predictors (i.e., peers, parents, school) are unclear. Development occurs in the context of an ecological framework (Bronfenbrenner, 1979), thus understanding the relationships between important factors within a child's world affords a more complete picture of the contributions and factors that impact the decisions made to use substances (Marsden et al., 2005). Case in point, affiliation with delinquent peers only increases middle school students' risk of tobacco use in the case of low parental involvement (Simons-Morton, 2002). Additional research is needed to understand how school-related variables may interact with established predictors of adolescent substance use.

Interactions Between Predictors of Substance Use

Current research in the field of substance use involves attempts to understand the interrelationships between environmental predictors of substance use in order to isolate the most salient influences (Feinberg & Duncan, 2006; Martino et al., 2006). Few studies have examined the simultaneous influence of peers (i.e., friends' prosocial behaviors and beliefs such as valuing school grades and engagement in athletics), parenting (i.e., parental control and support), community involvement, and school climate (e.g., levels of school spirit, relationship with teach-

ers, satisfaction with instruction). In one of the first such examinations, Coker and Borders (2001) provided a preliminary examination of a path model to test direct and indirect influences on adolescent problem drinking. Results indicated that "peer values" served as a mediator between all environmental variables and alcohol use; the most significant influences on the formation of "peer values" were school climate and parental support. This study is notable in its effort to provide a first examination of the interrelationships among important family, peer, and school predictors. Additional research is needed to address the limitations of this study, including (a) assessing the construct "peer values" which is, at best, a proxy indicator for frequency of interaction with deviant peers, the predictor supported by literature, (b) creating post hoc indicators of constructs through an existing database rather than using well-validated measures, and (c) only examining drinking which precludes generalization of findings to other substances such as cigarettes, marijuana, and other illicit substances.

Purpose of Current Study

The purpose of the current study was to address these limitations during an exploration of the relative influence of deviant peers, perceived authoritative parenting, and perceived teacher support on multiple types of adolescent substance use, including alcohol, cigarettes, and illicit drugs. The pathways by which the aforementioned predictors influence one another and the outcome (substance use) were examined through an empirical test of a structural model. We hypothesized that the actions of important adults in adolescents' lives influence adolescents' substance use only indirectly through influencing adolescents' decisions regarding peer groups, in line with research that demonstrates the salience of peers in early adolescence (Pardini, Loeber, & Stouthamer-Loeber, 2005; Steinberg & Silverberg, 1986). In other words, students with healthy relationships with their teachers and parents should be more likely to select prosocial peers who do not experiment with substances because of their relationships with adults who are invested in their moral development and who may model appropriate behavior. For instance, the influence of positive adult figures in the school setting who hold

negative beliefs about drugs has been found to decrease youth vulnerability to drug-related peer pressure (Kumpfer & Turner, 1991; Scheier & Botvin, 1997). On the other hand, students who do not feel supported by teachers and/or parents or have experienced rejection from these adults will be more likely to affiliate with deviant, rule-breaking peers who permit experimentation with and use of substances. Such a notion is in line with longitudinal research on high school failure that found that teacher rejection predicted student drop-out only indirectly via increasing students' associations with peers who used substances and got into trouble (Kaplan, Peck, & Kaplan, 1997). Finally, the current study expanded the existing literature on substance use that has been conducted with primarily at-risk youth (e.g., Bousman et al., 2005; Fishbein et al., 2006; Isralowitz & Reznik, 2006) by researching adolescents from an affluent suburban community. Substance abuse infiltrates a wide range of persons from urban to suburban communities (cf., Dishion, Reid, & Patterson, 1988; Luthar et al., 2005; Shears & Furman, 2005); however, research typically focuses on disadvantaged, urban youth.

Method

Participants

A total of 461 students from one middle school in an affluent suburb of a large city in a southeastern state in the United States participated in the study. After exclusion of 10 students whose data indicated false responding (i.e., self-reports of underreported or overreported personal drug use in response to the item on the American Drug and Alcohol Survey that asked students to indicate their degree of honesty when answering questions about substance use), the final sample retained for analysis included 451 students enrolled in grades 6 (41%), 7 (34%), and 8 (24%). The mean age was 12.60 ($SD = 0.97$) years. Fifty-eight percent of the students were girls. Seventy-seven percent were Caucasian, 8% were Hispanic/Latino, 4% percent were African American, 2% were Asian, 2% were Native American, and 7% were multiracial. Fourteen percent of the students reported qualifying for school lunch at a free or reduced price (an indicator of socioeco-

conomic status [SES]), considerably less than the district and state averages of 49% and 47%, respectively. Median home prices were also examined in support of the level of affluence of the data collection site. Data available on public state records at the time of data collection indicated that the median home price in this suburb was roughly \$140,000 higher than the state average of \$235,000.

Procedure

Each of the approximately 1,300 enrolled students were invited to participate in the study through an informational and informed consent letter that was distributed to all students, who were instructed to bring the letter to their caregivers. Small tangible incentives (\$25 gift cards provided to several students at random; breakfast parties provided to the homeroom in each grade level that returned the highest ratio of consent forms to classroom size) were offered to encourage the return of parent consent forms. A total of 508 students secured parent consent to participate (39% response rate). The 461 students who were present at school on data collection dates provided written assent to participate just prior to completing the self-report questionnaires. Data were collected from student participants on one occasion, in the summer of 2005, during the regular school day. Students completed a short demographics questionnaire followed by the self-report instruments described below during large group sessions (e.g., approximately 100 students seated every other seat in a large school cafeteria) moderated by a team of six trained research assistants. In an effort to control for order effects, six versions of the questionnaire packet were administered. Each version contained the self-report measures in a different order; students were randomly assigned one of the six versions to complete. Following completion of the instruments, students received a list of local resources that address substance use issues in adolescents.

Overview of Analyses

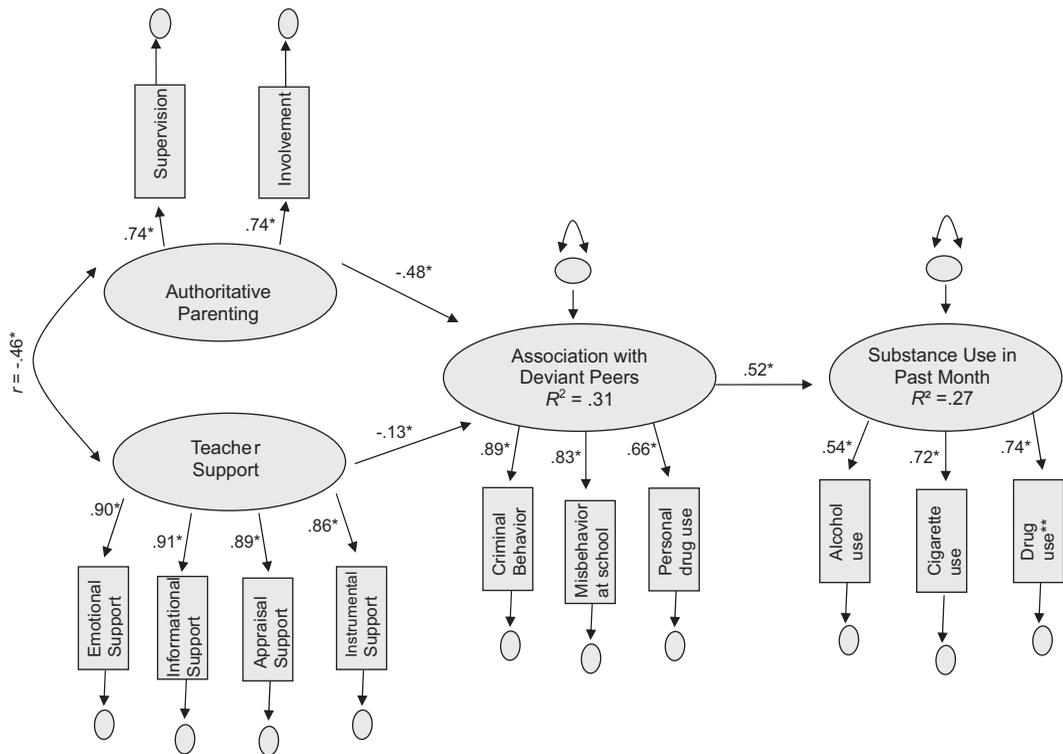
Latent variable structural equation modeling (SEM) was used to test a model depicting the pathways by which adolescents' perceptions of teacher support and authoritative parenting be-

haviors, as well as their affiliation with rule-breaking peers, related to their substance use. All constructs were measured at one time point. Latent variable SEM (vs. path modeling with observed variables) is advantageous in part because latent variables—constructed from multiple measures of the constructs in the model—permit the testing of causal theories as they pertain directly to the underlying constructs of interest, rather than to the measured variables whose observed relations are often attenuated by error of measurement (Hatcher, 1994). All analyses were conducted using SAS 9.1 (SAS Institute Inc., 2003). The tested version of the model that guided this research is shown in Figure 1 and is based on theory and research described earlier in this paper. Consistent with SEM terminology (see Kline, 2005), manifest variables (observed variables) are presented in rectangles and represent items or composites from students' self-report surveys. Latent variables (constructs) are presented in circles.

Variables in the Model

Authoritative parenting. The authoritative parenting latent variable was estimated from student responses to the Authoritative Parenting Measure (APM; Steinberg, Elmen, & Mounts, 1989). Thus, adolescents' perceptions of parenting styles, not observed parent behaviors, constituted the indices of authoritative parenting. The APM is a self-report that includes three scales to assess students' perceptions of the extent to which their parents' demonstrate psychological autonomy granting (parents employ noncoercive, democratic discipline and encourage the adolescent to express individuality within the family), strictness/supervision (parental supervision and monitoring of the adolescent's activities, as well as strictness through imposed curfews), and warmth/involvement (how loving, responsive, and involved parents are in their children's lives) (Steinberg, Lamborn, Dornbusch, & Darling, 1992). Additional details about each latent and measured variable, including response metrics that dictate the possible range of scores as well as internal consistency estimates (coefficient alpha) obtained with the current sample, are provided in Table 1.

Regarding content validity of the APM, items included in the questionnaire were adapted from previous measures of parenting practices or created by the scale authors to represent the three



*Indicates significance at the $p < .05$ level

**Includes marijuana, inhalants, and abused over-the-counter and prescription drugs

Figure 1. Final model of the relationships between teacher support, authoritative parenting, associations with deviant peers, and adolescent substance use.

dimensions of authoritative parenting (Steinberg et al., 1992). Exploratory factor analysis supported the presence of three distinct factors that corresponded to psychological autonomy granting, strictness/supervision, and warmth/involvement (Steinberg et al., 1992), a factor structure that was identified in separate analyses with groups of Caucasian, African American, Hispanic, and Asian adolescents (Steinberg, Mounts, Lamborn, & Dornbusch, 1991). Previous research with the APM has found that internal consistency for each scale ranges from .72 to .82 (Steinberg et al., 1992). The APM was initially used in research with students in grades 9 through 12, but has also been used successfully with middle school students (e.g., Suldo & Huebner, 2004). The current study used scores from the APM in their continuous form to provide indicators of each dimension of authoritative parenting, consistent with previous research that conceptualizes parenting styles as

continuous variables and recognizes the synergistic nature of parental authoritativeness (Steinberg et al., 1992).

Teacher support. The teacher support latent variable was estimated from students' responses to four subscales of the teacher support scale of the Child and Adolescent Social Support Scale (CASSS: Malecki, Demaray, & Elliot, 2000). Thus, adolescents' perceptions of teachers' provision of social support, not observed teacher behaviors, constituted the indices of teacher support. The CASSS is a self-report measure used to comprehensively assess children and adolescents' perceptions of social support from five sources (i.e., parents, teachers, classmates, close friend, and school personnel). Each source scale contains 12 items that measure four types of support (emotional, instrumental, appraisal, and informational) offered by the source. Students read each statement and rate how often they perceive a particular supportive behavior

Table 1
Composition and Metric of Latent and Measured Variables

| Latent variable | Measured variable | Reliability (α) | Source, composition, and response metric |
|--------------------------------|------------------------------|--------------------------|---|
| Authoritative parenting | Supervision | .75 | APM; mean of 2 items measuring student curfew (1 = <i>not allowed out</i> to 3 = <i>as late as I want</i>) and 6 items about parents' actual and desired knowledge of whereabouts (1 = <i>don't try</i> to 3 = <i>know a lot</i>) |
| | Autonomy promotion | .65 | APM; mean of 9 items reflecting parents' encouragement of independence in thought and responsibility (1 = <i>strongly disagree</i> to 4 = <i>strongly agree</i>) |
| | Involvement | .80 | APM; mean of 9 items reflecting parents' encouragement, support, and involvement in the child's life (1 = <i>strongly disagree</i> to 4 = <i>strongly agree</i>) |
| Teacher support | Emotional support | .89 | CASSS; mean of 3 items reflecting perceptions of care (1 = <i>never</i> to 6 = <i>always</i>) |
| | Informational support | .91 | CASSS; mean of 3 items reflecting perceptions of assistance with learning (1 = <i>never</i> to 6 = <i>always</i>) |
| | Appraisal support | .89 | CASSS; mean of 3 items reflecting feedback from teachers (1 = <i>never</i> to 6 = <i>always</i>) |
| | Instrumental support | .89 | CASSS; mean of 3 items reflecting teacher providing necessary materials (e.g., school supplies, time) (1 = <i>never</i> to 6 = <i>always</i>) |
| Association with deviant peers | Peers' criminal behavior | .84 | PDS; mean of 4 items reflecting proportion of friends involved in physical fights, stealing, arrests, and gangs (1 = <i>none of them</i> to 5 = <i>all of them</i>) |
| | Peers' misbehavior at school | .72 | PDS; mean of 3 items reflecting proportion of friends involved in cheating on tests, truancy, and drop out/expulsion from school (1 = <i>none of them</i> to 5 = <i>all of them</i>) |
| | Peers' personal drug use | .87 | ADAS; mean of 4 items reflecting proportion of friends who use marijuana, inhalants, cigarettes, and alcohol (1 = <i>none of them</i> to 4 = <i>all of them</i>) |
| Substance use (past month) | Alcohol use | .55 | ADAS; mean of 2 items assessing alcohol use in last month (experimental use and use to get drunk) (1 = <i>no use</i> to 5 = <i>20 or more times</i>) |
| | Cigarette use | NA | ADAS; 1 item assessing use of cigarettes in last month (1 = <i>no use</i> to 5 = <i>20 or more times</i>) |
| | Drug use | .51 | ADAS; mean use of marijuana, inhalants, over-the-counter medications, and prescription medications to get high in last month (1 = <i>no use</i> to 5 = <i>20 or more times</i>) |

Note. APM = Authoritative Parenting Measure; CASSS = Child and Adolescent Social Support Scale; PDS = Peer Delinquency Scale; ADAS = American Drug & Alcohol Survey; NA = not applicable.

from the given source; higher scores reflect more perceived social support.

Only data from the teacher source scale of the CASSS was analyzed in the current study. As reported in Malecki and Demaray (2003), construct validity for the teacher support scale is supported by a significant correlation ($r = .48$) with the teacher scale of the Social Support Scale for Children (SSSC; Harter, 1985). Regarding reliability, excellent internal consistency levels have been reported, with coefficient alpha ranging between .81 and .82 for the four types of support measured by the teacher scale (Malecki & Demaray, 2003). Test-retest reli-

ability coefficients obtained for a subsample of 49 students following an eight to 10 week interval ranged from .46 to .75 (Malecki & Demaray, 2003).

Affiliation with deviant peers. The association with deviant peers latent variable was estimated from students' responses to (a) an 11-item instrument we named the Peer Delinquency Scale (PDS) that is comprised of items used in two self-report instruments that assessed affiliation with rule-breaking and drug using peers in previous studies (see Heinze, Torro, & Urberg, 2004; Roeser, Eccles, & Sameroff, 2000) and (b) the 7-part item assessing friends'

use of substances on the American Drug and Alcohol Survey: Core Measures Short Form (ADAS; Rocky Mountain Behavioral Science Institute, 2003). With respect to the PDS, items reflect the number of friends who are involved in misbehavior at school (e.g., cheat on school tests, skip school), criminal behavior in the community (e.g., involvement in gangs, fighting, stealing), as well as use substances. With respect to the ADAS scale, items pertinent to peers' use of alcohol, cigarettes, marijuana, and inhalants were averaged to form a composite indicator of peer substance use.

Substance use. The substance use latent variable was estimated from students' responses to items on the American Drug and Alcohol Survey: Core Measures Short Form. The ADAS-Adolescent Version is a 55-item scale developed for use with students in grades 6 through 12. Questions address the use of illicit substances and related constructs. Scale developers report Cronbach's alpha reliabilities ranging from .72 to .94 on the 14 drug use scales (Rocky Mountain Behavioral Science Institute, Inc., 2003). Regarding concurrent construct validity, rates of drug use obtained using the ADAS are consistently similar to rates obtained via the University of Michigan's National Monitoring the Future Survey (Rocky Mountain Behavioral Science Institute, Inc., 2003). Students in the current study were administered portions of the Core Measures Short Form of the ADAS-Adolescent (ADAS-CMSF), which includes 12 items drawn from the original survey. Multipart items administered include use rates of alcohol, tobacco products, and illicit drugs in the past 30 days, peers' use of substances, and parental discussion of substances. Students were also asked to indicate their level of honesty when responding to survey items about substance use. Only items concerning use rates were analyzed as indicators of substance use. Although the use rates of 16 drugs were measured, due to extremely low base rates of use of some drugs such as heroin, LSD, and cocaine, only use of (a) marijuana, (b) inhalants, (c) over-the-counter medications (e.g., diet pills, cold medicine), and (d) prescription drugs to get high were averaged to form the indicator of drug use employed in the current study.

Results

Students' self-reported rates of substance use in the past month are presented in Table 2. For each substance use type, only a small minority of students reported any use in the past month. The substance used most frequently was alcohol; approximately 10% of students reported using alcohol at least one time in the past month. Similar proportions of students (approximately 8% of the samples) in 6th and 7th grade reported using alcohol; a slightly higher proportion (15%) of 8th-grade students reported any alcohol use. Only 1% to 5% of students in any grade level reported smoking cigarettes in the past month. In all grade levels, the type of illicit substance used by the most students to get high was over-the-counter medications (e.g., diet pills, cough syrups, cold pills); 9% of 6th-grade students reported any use in the past month, followed by 5% of the 7th- and 8th-grade samples.

Of note, the few students identified statistically as univariate or multivariate outliers were not removed from the dataset as a closer examination of the questionnaires completed by the "outliers" suggested that these students were identified because they were among the few students in the sample to report any substance use. Although endorsing use of substances was abnormal in the current sample (as shown in Table 2), these students were of particular interest in the current study and their data were thus retained for data analyses. Thus, the entire dataset consisting of 451 students was employed for the remainder of the analyses. Descriptive statistics and correlations between the manifest variables are presented in Table 3. As shown in Table 3, adolescents' recent use of alcohol has moderate, positive correlations with each indicator of deviant peer behavior as well as small but significant inverse relationships with each indicator of teacher support and two of three indicators of authoritative parenting (i.e., supervision and involvement/warmth). Cigarette and drug use were also positively associated with each indicator of peer deviance. Cigarette and drug use yielded small, inverse associations with two aspects of authoritative parenting—supervision and involvement/warmth. Drug use yielded a small, inverse association with teachers' emotional support. No other bivariate correlations between cigarette or

Table 2
Proportion of Students in Each Grade Level Reporting Substance Use

| Substance use variable | Students' reported use in past month | | | | |
|--|--------------------------------------|-----------|-----------|-------------|-----------|
| | None | 1–2 times | 3–9 times | 10–19 times | 20+ times |
| Total sample (<i>N</i> = 451) | | | | | |
| Drank alcohol | 90.47 | 8.87 | .67 | — | — |
| Gotten drunk | 98.00 | 1.77 | .22 | — | — |
| Smoked cigarettes | 98.00 | 1.55 | .44 | — | — |
| Used marijuana | 98.45 | .89 | .44 | — | .22 |
| Used inhalants | 96.45 | 2.44 | .67 | .22 | .22 |
| Used prescription drugs (e.g., painkillers, psychiatric medications) to get high | 99.11 | .67 | .22 | — | — |
| Used over-the-counter medications (e.g., diet pills, cough syrup) to get high | 93.35 | 3.77 | 2.00 | 0.22 | 0.67 |
| 6th grade (<i>n</i> = 187) | | | | | |
| Drank alcohol | 91.98 | 7.49 | 0.53 | — | — |
| Gotten drunk | 98.40 | 1.60 | — | — | — |
| Smoked cigarettes | 98.40 | 1.60 | — | — | — |
| Used marijuana | 99.47 | .53 | — | — | — |
| Used inhalants | 95.72 | 3.21 | 1.07 | — | — |
| Used prescription drugs | 98.93 | 1.07 | — | — | — |
| Used over-the-counter medications | 90.91 | 4.81 | 3.74 | .53 | — |
| 7th grade (<i>n</i> = 155) | | | | | |
| Drank alcohol | 92.26 | 7.10 | .65 | — | — |
| Gotten drunk | 98.06 | 1.94 | — | — | — |
| Smoked cigarettes | 99.35 | .65 | — | — | — |
| Used marijuana | 99.35 | .65 | — | — | — |
| Used inhalants | 96.13 | 2.58 | .65 | .65 | — |
| Used prescription drugs | 100 | — | — | — | — |
| Used over-the-counter medications | 95.48 | 3.23 | .65 | — | .65 |
| 8th grade (<i>n</i> = 109) | | | | | |
| Drank alcohol | 85.32 | 13.76 | .92 | — | — |
| Gotten drunk | 97.25 | 1.83 | .92 | — | — |
| Smoked cigarettes | 95.41 | 2.75 | — | — | 1.83 |
| Used marijuana | 95.41 | 1.83 | 1.83 | — | .92 |
| Used inhalants | 98.17 | .92 | — | — | .92 |
| Used prescription drugs | 98.17 | .92 | — | .92 | — |
| Used over-the-counter medications | 94.50 | 2.75 | .92 | — | 1.83 |

Note. Numbers in table represent percentages of students who endorsed each response option on the Core Measures Short Form of the ADAS-Adolescent for each indicator of substance use analyzed in the current study.

drug use and indicators of teacher support were statistically significant.

z tests conducted to test the significance of the difference between correlation coefficients for gender groups revealed that the magnitude and direction of the associations between the 10 predictors (three aspects of authoritative parenting, four types of emotional support, three indicators of deviant peers) and substance use (alcohol use in the past month, mean drug use) were similar for boys and girls for 17 of 20 correlations ($z < \pm 1.96$). Correlations between drug use and

two indicators of affiliation with deviant peers, peers' problematic behavior at school and peers' criminal behavior, were stronger among boys ($r = .43, p < .01$ and $r = .52, p < .05$, respectively) than girls ($r = .23, p < .05$ and $r = .28, p < .05$, respectively), $z = 2.35$ and $z = 3.00$, respectively. The correlation between alcohol use and one aspect of authoritative parenting (involvement) was stronger among girls ($r = -.27, p < .05$) than boys ($r = -.07, ns$), $z = -2.26$. Since the pattern of relationships between predictor variables and outcomes was similar for the

Table 3
Correlations, Means, and SDs of Measured Variables in Structural Model

| Variable | <i>M</i> | <i>SD</i> | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|----------|----------|-----------|-------|-------|-------|-------|-------|-------|------|------|------|------|------|------|
| 1. SAU | 1.06 | 0.21 | | | | | | | | | | | | |
| 2. SCU | 1.03 | 0.29 | .39* | | | | | | | | | | | |
| 3. SDU | 1.05 | 0.20 | .35* | .55* | | | | | | | | | | |
| 4. PDU | 1.28 | 0.52 | .35* | .24* | .28* | | | | | | | | | |
| 5. PMS | 1.50 | 0.62 | .32* | .21* | .29* | .54* | | | | | | | | |
| 6. PCB | 1.34 | 0.60 | .35* | .30* | .35* | .59* | .74* | | | | | | | |
| 7. APS | 2.48 | 0.36 | -.21* | -.16* | -.15* | -.32* | -.36* | -.37* | | | | | | |
| 8. APAP | 2.57 | 0.54 | -.08 | .06 | -.01 | -.01 | -.05 | -.06 | .14* | | | | | |
| 9. API | 3.32 | 0.52 | -.19* | -.13* | -.22* | -.23* | -.34* | -.31* | .55* | .12* | | | | |
| 10. TSE | 4.54 | 1.36 | -.18* | -.06 | -.10* | -.24* | -.37* | -.33* | .31* | .17* | .39* | | | |
| 11. TSIF | 4.77 | 1.24 | -.11* | -.05 | -.04 | -.19* | -.28* | -.24* | .28* | .12* | .31* | .84* | | |
| 12. TSA | 4.43 | 1.39 | -.10* | .00 | -.03 | -.14* | -.28* | -.23* | .24* | .15* | .31* | .78* | .79* | |
| 13. TSIS | 4.17 | 1.44 | -.10* | -.06 | -.06 | -.16* | -.26* | -.24* | .23* | .14* | .33* | .76* | .78* | .81* |

Note. SAU = Student Alcohol Use; SCU = Student Cigarette Use; SDU = Student Drug Use; PDU = Peer Drug Use; PMS = Peer Misbehavior at School; PCB = Peer Criminal Behavior; APS = Authoritative Parenting–Supervision; APAP = Authoritative Parenting–Autonomy Promotion; API = Authoritative Parenting–Involvement; TSE = Teacher Support–Emotional; TSIF = Teacher Support–Information; TSA = Teacher Support–Appraisal; TSIS = Teacher Support–Instrumental.

* $p < .05$.

vast majority of variables, data for boys and girls was collapsed in the path model.

A structural model attempting to explain the significant relationships between perceptions of parenting and teacher support and adolescent substance use completely through a mediator (deviant peers) was tested. Data were analyzed using the SAS System's CALIS procedure, and the model included multiple indicators for all latent constructs. Of note, since correlational analyses failed to yield significant associations between autonomy promotion and any indicator of substance use, this variable was not included in the path model; instead, supervision and involvement were employed as the sole indicators of authoritative parenting. A correlation matrix was fit and parameter estimates were achieved via full information maximum likelihood methods. Figure 1 presents a graphical representation of the hypothesized model that was tested, as well as obtained standardized coefficients and R^2 values.

Each of the three hypothesized paths between latent variables was significant, suggesting important relationships between the predictors, mediator, and outcome variable. To assess the relative fit of the sample data to the hypothesized path model, selected fit indices were examined. The two-index strategy advanced by Hu and Bentler (1999) was used to evaluate fit

of the data to the hypothesized model. Specifically, the standardized root-mean-square residual (SRMR) was examined; a value lower than .08 was desired. In addition to acceptable SRMR, values above .95 for the Comparative Fit Index (CFI) and/or the Tucker-Lewis Index (TLI) were used to determine a good-fitting model.

The SRMR value was .02 and the CFI and TLI statistics were .97 and .96, respectively, indicating that the hypothesized model was a good fit to the data. While the χ^2 exact test indicated the model should be rejected ($\chi^2 = 134.56$, $df = 50$, $p < .001$), this index is sensitive to sample size. In studies in which the sample size is large, calculating the normed χ^2 (NC) is suggested (Kline, 2005). The chi-square to degrees of freedom ratio obtained in the current study (NC = 2.69) is in line with acceptable values. In addition to two-index support for the model, an examination of the path coefficients revealed that all manifest variables served as valid indicators of their particular construct (see standardized coefficients in Figure 1). Based on the squared multiple correlation coefficients, 27% of the variance in students' substance use and 31% of the variance in students' association with deviant peers was accounted for by the model.

Examination of the model reveals a large direct effect of affiliation with deviant peers on adolescent substance use. The influence of perceived authoritative parenting and teacher support on students' substance use was fully mediated by affiliation with deviant peers; no direct effects were suggested by the model. Authoritative parenting had a moderate indirect effect on adolescent substance use (-.25) while the indirect effect of teacher support on adolescents substance use was weak (-.07). Of note, the moderate, significant correlation ($r = .46, p < .05$) between the two exogenous variables in the model indicates that high perceptions of teacher support tend to co-occur with high perceptions of authoritative parenting.

Discussion

The current study clarified the bivariate associations and interrelationships between ecological predictors (i.e., teacher support, authoritative parenting, affiliation with deviant peers) of alcohol, cigarette, and drug use during early adolescence within a sample of youth from an affluent suburban community. This study provided support for a theoretical model in which the influence of adults within adolescents' families and schools are linked to adolescents' substance use through associations with students' choices of friends, specifically the extent to which adolescents affiliate with rule-breaking and substance-using peers.

Regarding bivariate associations between relationships with adults central to adolescents' lives and adolescents' substance use, the current study reaffirmed the salience of parental involvement and support to adolescents' alcohol and drug use, a finding consistent with research that demonstrated higher levels of perceived parental monitoring and warmth during early adolescence predicted lower rates of substance use five years later (Cleveland et al., 2005). The current study also provided additional evidence for teacher support as a correlate of alcohol use in early adolescence, consistent with research that found an inverse relationship between teacher support and alcohol use among middle school boys who perceived their academic abilities to be low (Lifrak et al., 1997). The significant, albeit small, inverse correlation between perceived emotional support from teachers and students' drug use is consistent with previous

research with middle and high school students that found that students who were dissatisfied with school, in part due to low perceptions of teacher care and fairness, were more likely to initiate regular use of marijuana (van den Bree & Pickworth, 2005). However, the current study did not support significant links between other types of social support (e.g., instrumental, appraisal, informational support) and student drug use (nor cigarette use). Of note, these null results may be in part an artifact of very low base rates of recent substance use, particularly cigarette and drug use, in the current study of students in grades 6 through 8.

While the confirmation of associations between teacher support and use of some types of substances augments the scant literature on schooling and students' substance use, perhaps the most important findings in the current study pertain to the pathway by which these variables are linked. The current study tested a model in which students' perceptions of teacher support and authoritative parenting were indirectly associated with substance use through correlations with students' affiliations with deviant peers. Results indicated that the influences of relationships with important adults were fully mediated by students' associations with deviant peers. Students who perceive higher levels of social support from their teachers and/or greater levels of authoritative parenting are less likely to associate with rule-breaking and/or drug-using peers, and, in turn, less likely to use illicit substances. These findings are consistent with Coker and Borders' (2001) finding that a positive school climate (including perceived teacher interest and reinforcement) and parental support during students' 8th-grade year predicted students' affiliations with peers who held prosocial values and the frequency of adolescents' binge drinking during 10th grade.

Notably, the current study extends research on the correlates and pathways of substance use to a distinct group—suburban students with economic advantage. McMahon and Luthar (2006) contend "... researchers assume that, when compared with children living in more difficult circumstances, children living in affluent environments enjoy social and economic advantages that decrease risk for psychosocial problems" (p. 72). In fact, recent research provided additional evidence that teenagers from high SES families and, specifically, teenagers

with the greatest family financial resources are at increased risk for substance use (Hanson & Chen, 2007). The current study augments the small body of literature that examines the problem of substance use among students in affluent communities.

Implications for Practice

The finding that affiliations with deviant peers accounted for a substantial amount of the variance in adolescents' substance use is consistent with previous research underscoring the intrinsic links between rule-breaking peers and adolescent substance use (Aseltine, 1995; Svensson, 2000). Considering the relative stability of peer groups during adolescence (Degirmencioglu, Urberg, Tolson, & Richard, 1998), direct attempts to intervene following the formation of deviant peer groups (i.e., attempts to facilitate relations with prosocial peers via such strategies as peer mentoring, social skills training, and increased involvement in supervised afterschool sports or activities) may be admirable but inefficient uses of practitioners time, not to mention met with considerable resistance by adolescents reluctant to change their circle of friends. Instead, it is prudent to adopt a more preventative stance by fostering strong relations with important adults during late childhood and early adolescence, as opposed to intervening after friendships with rule-breaking peers have formed. The current study's finding that almost one third of the variance in children's affiliations with deviant peers was explained by the students' perceived relations with their teachers and parents supports the likely large influence improved perceptions of important adult behaviors will have on students' choice of peer group. This is in line with previous studies that found students' perceptions of their relationships with parents and teachers were strongly linked to their associations with rule-breaking and substance-using peers (Brody et al., 2001; Fergusson & Horwood, 1999; Kaplan et al., 1997).

The current study found that each type of teacher support was significantly, albeit weakly, associated with middle school students' alcohol use, and that students who perceived more emotional support from teachers reported less drug use. Thus, school psychologists may educate teachers about the positive outcomes likely as-

sociated with providing students with (a) information and advice (informational support), (b) evaluative feedback on their behavior and performance (appraisal support), (c) needed resources such as time and/or material goods (instrumental support), and especially (d) actions and words that convey care and trust (emotional support). Malecki and Demaray's (2003) research on the relationship between teacher support and a different set of student outcomes—social skills and academic competence—found a particularly strong effect for emotional support from teachers, leading the authors to conclude "teachers should attend to the atmosphere they create in their classroom and the perceptions they create that students are cared for and treated fairly" (p. 249). In sum, teacher awareness of the importance of fostering positive student-teacher relations may serve to not only decrease the frequency of alcohol and drug use, but also indirectly influence academic problems associated with substance use, such as diminished school attendance, interest in school, and academic achievement (e.g., poor grades, failure to complete high school) (Bryant et al., 2003; McGarvey et al., 1996; Zimmerman & Schmeelk-Cone, 2003).

In light of the larger magnitude of the indirect effects of authoritative parenting on adolescent substance use, it is even more imperative to assist parents in recognizing the benefits of behavioral monitoring and warmth. These recommendations are consistent with Steinberg's (2001) call for large-scale, multifaceted, public health campaigns geared toward sharing the accumulation of research support for the benefits of authoritative parenting during the teenage years.

Results from the current study support the utility of systems-level attempts to disseminate specific findings regarding adult behaviors (social support, authoritative parenting) associated with adolescents' choices of peer groups. School psychologists can further their involvement in the problem of substance use through facilitating implementation of systems-level prevention programs that are based on empirical research. One recommended resource is Tolan, Szapocznik, and Sambrano's (2007) handbook that translates research findings to practical applications. This edited text reviews multiple evidence-based programs that target factors critical in preventing adolescent substance use, in-

cluding parenting and family relationships and school achievement.

Study Limitations and Implications for Future Research

Suggestions for future research are offered to address limitations of the present study, such as the reliance on self-report data collection methods which (a) limits this study to student perceptions and evaluations of their teachers and parents' behaviors and (b) may result in substantial overlap (i.e., shared variance) between theoretically distinct constructs due to the sole reliance on self-report methods. Additional research that gathers objective information via interviews with parents or direct observations of teacher behaviors, for instance, is needed to confirm associations between students' substance use and their relationships with key adults.

Next, this initial test of a model of the pathways by which adults at school and in families influence adolescents' substance use was limited to a convenience sample of early adolescents yielded through active consent procedures. Previous research with 12- to 15-year-olds found that students recruited through active consent procedures reported less experimentation with illicit drugs (i.e., marijuana, ecstasy) than students recruited through passive consent procedures; no differences were found in use rates of tobacco and alcohol (White, Hill, & Effendi, 2004). The current findings warrant replication with representative samples of aggressively recruited youth, potentially through consent procedures that allow concerned parents to opt their children out of the study, but do not require the return of signed permission slips for participation in anonymous research. Also, studies in which the model described in the current article is tested in samples of students from different socioeconomic groups (e.g., economically challenged neighborhoods) are needed to determine whether results in the current study generalize to other populations of students in schools. Future research with samples of middle school students should also consider assessing students' *attitudes* toward substance use (for an example, see Pilgrim, Abbey, & Kershaw, 2004) rather than *actual use* to date due to the low base rates of actual substance use among early adolescents, which results in less

power to detect significant relationships with other variables due to the extreme skew of the substance use variable. The importance of examining students' attitudes toward substance use is further justified by research demonstrating the concurrent and predictive relationships between substance use-related attitudes (e.g., perceived harm, outcome expectancies, resistance self-efficacy) and actual use; for instance, Musher-Eizenman, Holub, and Arnett (2003) found that middle school boys' and girls' use of cigarettes and alcohol, respectively, was linked to their perceptions of positive outcomes (e.g., increased popularity) and/or low beliefs that negative outcomes (e.g., diminished academic and athletic performance) would result from using such substances.

The current study is also limited by a cross-sectional design in which all constructs were assessed at one time point; longitudinal research is needed to support directionality among relationships postulated in the proposed model. For instance, the indirect association between teacher support and students' substance use may operate in reverse as originally hypothesized, such that adolescents' affiliations with deviant peers and personal substance use causes adults in the adolescents' lives to respond to them with rejection and apathy. A longitudinal design that tracks authoritative parenting, teacher support, and peer associations over time would help clarify the development of substance use. Finally, the current study was limited by a relatively narrow examination of predictor variables. Future studies should isolate additional factors that influence adolescents' selection of deviant or prosocial peers and include these in a more comprehensive model.

Despite these limitations, the current study advances the literature by providing an empirical test of a model offered to explain how relationships with adults are linked to adolescents' substance use. Results illustrate the important links between social experiences at school, parent-child relations, affiliations with rule-breaking and substance using peers, and middle school students' substance use. Coupled with the widespread support for the deleterious effects of substance use on students' social, emotional, and educational development (Johnston et al., 2004; McGarvey et al., 1996; Zimmerman & Schmeelk-Cone, 2003), current findings highlighting the role of ecological variables,

including positive student-teacher relations, reinforce the merit of contributing school-based resources to prevention and intervention efforts.

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