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The influence of parental monitoring and parent-adolescent communication on Bahamian adolescent risk involvement: A three-year longitudinal examination

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Abstract

The literature suggests that parental monitoring can best be conceptualized and measured through the domains of parental knowledge, youth disclosure, parental solicitation, and parental control. Using longitudinal data on 913 grade-six Bahamian students followed over a period of three years, we examined the unique and independent roles of these domains of parental monitoring and parent–adolescent communication in relation to adolescent involvement in delinquency, substance use, and sexual risk behaviors. The results obtained with mixed-effects models indicate that parental knowledge, youth disclosure, and parental control are negatively associated with both delinquency and substance use. Open parent–adolescent communication was associated with decreased sexual risk behavior, whereas problematic parent–adolescent communication was associated with increased sexual risk behavior. The results obtained with path models indicate that youth disclosure is a significant longitudinal predictor of reduced adolescent delinquency and that parental control during early adolescence predicted reduced substance use in middle adolescence. The findings suggest that parental knowledge, youth disclosure and parental control differ in their impacts on substance use, delinquency and sexual risk behaviors. Problematic parent–adolescent communication is consistently associated with increases in all three types of adolescent risk behaviors. Future parental monitoring interventions should focus on enhancing parents' interpersonal communication skills and emphasize the differences in and importance of the unique components of parental monitoring.

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Keywords

adolescent; parental knowledge; youth disclosure; parental solicitation; parental control; parent–adolescent communication; risk behaviors; Bahamas

Introduction

Adolescence is a dynamic period during which dramatic physical, cognitive, and social developments occur. During the middle adolescence phase, youth undergo substantial physical maturation, but their cognitive development may lag (Steinberg, 2005). This developmental gap creates a period during middle adolescence of heightened vulnerability to risk-taking and problem behaviors (Steinberg, 2004; Steinberg, 2005). Compounding the developmental gap, adolescents, given their limited exposure to a range of life experiences, may lack essential skills relevant to decision-making and the ability to understand the consequences of risky behaviors (Oldershaw et al., 2009; Overman et al., 2004). As a result, they may become involved in a wide range of high-risk behaviors, including substance use, delinquency, and unprotected sex (McMorris et al., 2007; Steinberg, 2004). Parents have an opportunity to play an important role in preventing their youth from engaging in risky behavior during this critical period of early to middle adolescence by providing constructive parental monitoring and effective parent–youth communication (Coley et al., 2009; DiClemente et al., 2001a).

Over the past two decades, numerous studies have examined the relationship between parental monitoring and adolescent problem behaviors and have documented the consistent link between higher levels of parental monitoring and lower levels of problem behaviors, including delinquency (Jacobson & Crockett, 2000; Pettit et al., 2001), substance use (Barnes et al., 2000), and risky sexual behaviors (Crosby et al., 2002; DiClemente et al., 2001b). However, the association between parental monitoring and problem behavior has been brought into question by several studies that have observed that the measures of parental monitoring commonly used in the literature assess parents' knowledge about their adolescents' whereabouts and activities rather than active monitoring efforts by parents (e.g., checking with neighbors about the location and/or activities of a child and establishing and enforcing rules about the child's activities) (Crouter & Head, 2002; Kerr & Stattin, 2000; Stattin & Kerr, 2000). These studies suggest that many of the existing measures of "parental monitoring" do not adequately capture the construct and identify a need for additional measures and refinement of components of parental monitoring. In reexamining the role of parental monitoring in problem behavior prevention, Stattin and Kerr (2000; Kerr & Stattin, 2000) categorized potential sources of parents' knowledge of their adolescent's activities, such as youth disclosure (voluntary disclosure by youth of information about their activities to parents), parental solicitation (parents asking for information from the youth and the youth's friends), and parental control (parents setting rules that require youth to provide information).

Several recent studies have attempted to examine the contribution of youth disclosure, parental solicitation and parental control to adolescent risk involvement. These studies have

yielded inconsistent findings (Fletcher et al., 2004; Keijsers et al., 2010, Kerr et al., 2010). Kerr and Stattin (2000) found in a cross-sectional study that youth disclosure was the strongest predictor of delinquent behavior. The finding that parental solicitation and control are not predictive of delinquent behaviors was reinforced in a recent longitudinal study (Kerr et al., 2010). These findings are supported by those of several recent studies that found that youth disclosure, but not parental solicitation or control, predicted delinquent behavior (Keijsers et al. 2010) and alcohol use (Stavrinides et al., 2010). In contrast, Fletcher et al. (2004) found that parental control was a strong predictor of decreased adolescent substance use. Laird et al. (2010) reported that adolescents' perceptions of greater parental solicitation are strongly associated with lower levels of delinquent behavior among adolescents who spend more time unsupervised. In contrast, Kiesner et al. (2009) found that high levels of parental solicitation are associated with *increases* in later youth delinquent behavior.

Another protective family factor that has been studied frequently in adolescent risk behavior research is parent–adolescent communication. Each of the components of parental monitoring may operate in the broader context of parent–adolescent communication (Low et al., 2012). Healthy parent–adolescent communication provides an environment in which adolescents are comfortable sharing information about their activities with their parents (Kopko & Dunifon, 2010). Cottrell et al. (2007) found that open parent–child communication is positively associated with a general measure of “parental monitoring.” Research on adolescent problem behaviors has identified open communication between parents and their adolescents as a protective factor, whereas problem communication has been identified as a risk factor for adolescent risk behavior (e.g., drug use and unprotected sex) (Stanton et al., 2002; Yu et al., 2006). Studies have demonstrated that parent–adolescent communication about sex (especially communication before the onset of youth sexual activity) promotes healthy sexual development and decreases adolescent involvement in sexual risk behaviors (Atienzo et al., 2009; DiClemente et al., 2001a). However, a study of rural adolescents indicated that there was no direct relation between the frequency of general communication and adolescent sexual risk behaviors (Huebner & Howell, 2003).

The importance of parental monitoring and communication to adolescent risk behavior is related to the nature and relationship of various risk behaviors. Would we expect parental monitoring and communication to impact the three categories of risk behaviors in a similar manner? Arguing in favor of such a relationship is the robust evidence that delinquency, substance use and/or sexual risk behavior constitute a “problem behavior syndrome” with common causes and influences underlying all three behavioral categories (Jessor & Jessor, 1977). Further supporting this perspective, delinquency has been shown to predict the subsequent early initiation of sexual activity (Capalidi et al., 1996) and sexual risk behaviors, including unprotected sex and multiple sex partners (Devine et al., 1993; Elliot & Morse, 1989). Delinquency and substance use often co-occur among adolescents, and both have been prospectively related to adolescent pregnancy (Scaramella et al., 1998). However, empirical evidence suggests that different behaviors may respond differently to monitoring and communication. Although sexual risk behaviors are correlated with delinquency and substance use among adolescents, the three problem behaviors may follow different developmental trajectories over time, and there is some question as to whether one problem

behavior necessarily leads to another (Mason & Windle, 2001). Some evidence suggests that sexual risk develops independently of other problem behaviors (Ensminger, 1990; Stanton et al., 1993). One study that examined the relationship between specific components of monitoring and various adolescent problem behaviors found that parental control predicted reduced substance use but not adolescent delinquency, while parental knowledge predicted both problem behaviors (Fletcher et al., 2004).

A number of studies have consistently found that youth disclosure is an important predictor of delinquent behavior (Keijsers et al., 2010; Kerr et al., 2010). In contrast, findings regarding the effects of parental solicitation and control on adolescent risk behavior are mixed (Laird et al., 2010). Few studies have addressed the facilitating role of parent–youth communication in effective monitoring (Low et al., 2012), and most have focused on delinquent behavior, without considering substance use and sexual risk behaviors (Kerr et al., 2010; Laird et al., 2003; Stavrinides, 2011). Finally, a majority of the existing studies focusing on parental monitoring have been cross sectional (Huang et al., 2011) and thus have lacked the perspective that longitudinal studies afford.

Accordingly, this study uses four waves of data from a three-year longitudinal study to investigate the components of “parental monitoring” (parental knowledge, youth disclosure, parental solicitation, and parental control) and parent–adolescent communication (open and problematic communication). We simultaneously examined the unique and independent roles of each of these constructs in relation to adolescents’ involvement in the discrete risk activities of delinquency, substance use, and sexual risk behaviors. Specifically, we first examined the associations of parental knowledge, youth disclosure, parental solicitation, and parental control with adolescent risk involvement (delinquency, substance use and sexual risk behaviors) through early to middle adolescence, before and after controlling for parent–adolescent communication. We then examined longitudinal relationships between the four components of “parental monitoring” in early adolescence, open and problematic parent–adolescent communication, and adolescent risk involvement in middle adolescence.

Methods

Study site

A decade ago, the adult HIV seroprevalence in the Bahamas was 5%. This rate has been reduced, by a coordinated national effort, to 2.2% (UNAIDS, 2011). Nonetheless, AIDS remains the leading cause of death among adults 15 to 49 years of age in the Bahamas. The main route of HIV transmission is heterosexual contact. The Bahamian island of New Providence was selected as the study site because it is home to 65% of the nation’s population, including an estimated 86% of those infected with HIV (Bahamian Ministry of Health, 2006).

Participants

The study was carried out from September 2004 to December 2008 in 15 government elementary schools in New Providence. A detailed description of the intervention development and assignment can be found in our previous publications (Chen et al., 2009;

Gong et al., 2009). The original study was a three-pronged intervention among 1,360 sixth-grade students. In the present analysis, we excluded the subset that received parental monitoring intervention (436 students) because this intervention may alter the natural longitudinal relationships that were being explored in this study. The data were obtained from four surveys of the youth (a baseline survey and three post-intervention follow-up surveys conducted 12, 24 and 36 months after the intervention). Among the 924 students who participated in the baseline survey, 913 provided complete data on parental monitoring and/or parent-adolescent communication and constitute the baseline sample in the current study.

The follow-up rates were 89% at 12 months, 86% at 24 months, and 83% at 36 months of post-intervention. The mean age of the youth at the baseline was 10.4 years (with a range from 10 to 14 years), and 55.8% were females. Ninety-nine percent of the youth were of African descent.

Data Collection Procedures

Data were collected using the Bahamian Youth Health Risk Behavioral Inventory, a paper-and-pencil questionnaire administered in a classroom setting (Deveaux et al., 2007). The questionnaire was adapted from the Youth Health Risk Behavioral Inventory (Stanton et al., 1995) through extensive ethnographic research and pilot testing. The questionnaire was read out loud by project staff while the students marked their responses on the questionnaire forms. The students required approximately 45 minutes to complete the questionnaires. The students and their parents were informed that their participation was voluntary, and their answers were confidential; written youth assent and parental consent were required for participation in the study. Teachers were asked to leave the classrooms during the survey. Each student was given a voucher worth \$5 Bahamian after completing the survey. The research protocol and the questionnaires were approved by the institutional review boards at Wayne State University in the United States and the Princess Margaret Hospital in the Bahamas.

Measures

Delinquency, substance use and sexual risk behaviors

Adolescents reported whether they had engaged in various types of delinquent and aggressive behaviors, including whether they had been suspended, been truant, carried a knife or screwdriver as a weapon and/or engaged in a fight in the past six months. A composite score ranging from 0 to 4 was computed for *adolescent delinquency*, with higher scores indicating more extensive risk involvement (Cottrell et al., 2007). The questions assessing youth involvement in substance use asked about cigarette smoking, alcohol consumption, marijuana use, and involvement in drug trafficking over the past six months. A composite score ranging from 0 to 5 was calculated for *substance use behavior*. The questions pertaining to *sexual risk behavior* addressed whether the youth had ever had sex, had ever had anal sex, had not used condom consistently and/or had had two or more sexual partners in the last six months. A sexual risk composite score was computed on the basis of

the abovementioned items (ranging from 0 to 4), with higher scores indicating higher sexual risk.

Youth-reported parental knowledge, parental solicitation, parental control and youth disclosure

A validated eight-item parental monitoring scale (Li et al., 2000; Small & Kerns, 1993) was employed to assess adolescents' perceptions of parents' knowledge about their activities and parental monitoring activities. The seven items were assigned to four domains (one item was deleted as it measured the outcome of parental control rather than parental control itself). One domain focused on the extent to which parents were knowledgeable about adolescents' whereabouts and activities (*parental knowledge*) and included the following two items: (a) my parents/guardian know where I am after school, and (b) when I go out at night, my parents/guardian know where I am. A second domain focused on how much adolescents tell their parents about their activities (*youth disclosure*) and included the following three items: (a) if I am going to be home late, I tell my parents/guardian; (b) I tell my parents/guardian who I'm going to be with before I go out; and (c) I talk with my parents/guardian about the plans I have with my friends. The third domain assessed the frequency with which parents solicited information about adolescents' activities (*parental solicitation*) and included one single item: when I go out, my parents/guardian ask me where I'm going. The fourth domain focused on the extent to which parents imposed restrictions on adolescents' activities (*parental control*) and included one single item: when I go out, my parents/guardian tell me what time I'm going to return. Responses to these items were based on a five-point Likert scale (1=never to 5=always). Individual items were averaged to yield a scale score ranging from 1 to 5. The Cronbach alphas for parental knowledge and youth disclosure were 0.67 and 0.71, respectively.

Parent–youth communication

Parent–youth communication was measured using the parent–adolescent communication scale developed by Barnes and Olsen (1982). The scale comprises 10 items measuring the degree of openness in parent–youth communication (“open communication”) and 10 items measuring the extent of problems in parent–youth communication (“problematic communication”). Examples of open communication are “It is very easy for me to express my true feelings to my parents” and “When I ask questions, I get honest answers from my parents.” The problem communication scale includes items such as “My parent has a tendency to say things to me that would be better left unsaid” and “When we are having a problem, I often give my parents the silent treatment.” All items were measured on a five-point Likert scale (1=strongly disagree to 5=strongly agree). The Cronbach alpha for the scale was 0.81 for open communication and 0.68 for problematic communication. For each subscale, individual items were averaged to yield a scale score ranging from 1 to 5, with higher scores indicating higher degrees of openness or problems in parent–youth communication.

Analysis

The proportions of youth involved in specific risky behaviors at the baseline time and at each follow-up time (years 1, 2, and 3) were computed, and the proportions at different time points were compared using generalized estimating equations (GEE). Bivariate correlation analysis was conducted using Pearson correlation coefficients to examine the strength of the associations among the variables.

Given the hierarchical nature of our data (students clustered in classes in 10 schools) and possible intra-class correlation by class and by school, mixed-effects regression analysis was conducted to identify predictive factors for delinquency, substance use and sexual risk behaviors. In mixed-effects models, time-varying variables, such as parental knowledge, youth disclosure, parental solicitation and control, open and problematic communication (at the baseline time and at the follow-up times at years 1, 2, and 3) and time-invariant variables (gender and baseline age), were included as predictors. The models also tested the “time” effect on outcome variables.

Path analysis was conducted on the longitudinal data to investigate the long-term effects of parental knowledge, youth disclosure, parental solicitation, and parental control in early adolescence (grades six and seven) on adolescent risk involvement in middle adolescence (grade nine). Longitudinal path models were constructed separately for delinquency, substance use and sexual risk involvement. Youth risk involvement variables (delinquency, substance use, and sexual risk) were positively skewed; log transformations were constructed to improve the distributional properties of these variables. Parameters were estimated by maximum likelihood (ML) methods. Standardized coefficients for all paths were calculated. Goodness of model fit was evaluated using the goodness-of-fit index (GFI), the ratio of the chi-square value to the degrees of freedom (χ^2/df), the root mean square error of approximation (RMSEA), Bentler’s comparative fit index (CFI) and the non-normed fit index (NNFI) (Hatcher, 2005). Acceptable model fit was taken to be indicated by an RMSEA less than 0.08; values of GFI, CFI and NNFI greater than 0.90 and a χ^2/df ratio less than 3 (Hatcher, 2005; Hu & Bentler, 1999). All statistical analyses were performed using the SAS 9.2 statistical software package (SAS Institute Inc., Cary, NC, USA).

Results

1) Involvement in risk behaviors from grade six to grade nine

Youth involvement in risk behaviors at the baseline and at years 1, 2 and 3 are depicted in Table 1. For delinquent behaviors, the proportions of youth who reported being suspended from school or carrying a weapon increased from 2% and 4%, respectively, at the baseline to 16% and 10%, respectively, in the year-3 follow-up. Fighting decreased from 34% at the baseline to 25% in year 3, while truancy remained stable (4.3% at the baseline and 4.4% in year 3). Alcohol and marijuana use increased from 19% and 0.4%, respectively, at the baseline, to 30% and 3%, respectively, in year 3. The proportion of youth who smoked cigarettes was 2.2% at the baseline, 2.9% in year 2 and 2% in year 3. At baseline, 1% and 1.7% of youth sold or carried drugs or had been asked to sell drugs, respectively, and at year 3, the percentages were 2.1% and 2.8% of youth, respectively. The proportion of sexually

experienced youth increased from 3.5% at the baseline to 31% at year 3. The proportion of youth reporting ever having had anal sex was approximately 1% at the baseline and 11% at year 3. The proportion who reported having had two or more sex partners in the last six months increased from 0.2% at the baseline to 4.7% at year 3. Reported condom use during the most recent sexual encounter increased significantly, from 33% at the baseline to 73% at year 3.

2) Bivariate correlation

Descriptive statistics and bivariate correlations are presented in Table 2. Parental knowledge, youth disclosure, parental solicitation and parental control were highly correlated with each other at the baseline (grade six) and in years 1, 2 and 3 (grades seven, eight and nine, respectively; $r=0.41-0.79$, $p<0.001$). Parental knowledge and youth disclosure increased from grade 6 to grade 7 and were sustained in grades 8 and 9. Parental control decreased over time, while parental solicitation remained relatively stable. Open communication increased from grade 6 to grade 7 and then decreased in grades 8 and 9. Problematic communication decreased from grade 6 to grade 7, was steady in grade 8 and then increased in grade 9. Open parent–adolescent communication was negatively correlated with problematic communication in years 1, 2, and 3 [$r=-0.18$ to -0.32 , $p<0.001$). Adolescent delinquency, substance use, and sexual risk behaviors were highly correlated with each other at the baseline and years 1, 2, and 3 ($r=0.20-0.53$, $p<0.001$). Parental knowledge, youth disclosure, parental solicitation, and parental control were positively associated with open parent–adolescent communication ($r=0.21-0.41$, $p<0.001$) and negatively associated with three types of risk behaviors (delinquency, substance use and sexual risk behaviors) at baseline and Years 1, 2, and 3. Parental knowledge, youth disclosure, and parental control (rather than parental solicitation) were negatively associated with problematic communication in years 1, 2, and 3.

3) Mixed-effect models for predicting adolescent risk involvement from grade 6 through grade 9

The results of mixed-effects regression analysis using adolescents' reports of parental knowledge, solicitation and control, youth disclosure, and open and problematic communication from grade 6 through grade 9 are presented in Table 3. The estimated coefficients for the monitoring and communication variables are listed under models 1 through 8. In the first set of analyses (models 1, 3, 5, and 7), we only considered parental knowledge, youth disclosure, parental solicitation, parental control, age, and gender. In the second set of analyses (models 2, 4, 6 and 8), we extended the mixed models to include parent–adolescent communication variables (i.e., open and problematic communication). The results indicate that higher levels of parental knowledge, youth disclosure and parental control were negatively associated with adolescent delinquent and substance use behaviors (models 3 to 6). However, none of these measures was associated with sexual risk behaviors, although open and problematic parent–adolescent communication were predictive of sexual risk behaviors (models 7 and 8). Problematic parent–adolescent communication was associated with increases in all three types of risk behaviors (models 4, 6 and 8). In the overall risk involvement models (models 1 and 2), all monitoring and communication variables, except parental solicitation, were significant predictors of adolescent risk

involvement. In addition, adolescents' involvement in delinquency, substance use and sexual risk behaviors increased over time, and the rates of risk behaviors were significantly higher for males than for females.

4) Path models of the hypothesized relationships

Longitudinal path models demonstrated the direct and indirect effects of parental knowledge, youth disclosure, parental solicitation, and parental control during early adolescence on adolescent risk involvement in middle adolescence (Figure 1). There were five exogenous variables (i.e., parental knowledge, youth disclosure, parental solicitation, parental control, and adolescent risk involvement in grades six and seven) and three endogenous variables (e.g., open and problematic communication in grade eight and adolescent delinquency/substance use/sexual risk behaviors in grade nine) in the models. The exogenous variables were allowed to covary. The initial models included all paths from the five exogenous variables to the three endogenous variables and paths from open communication and problematic communication to risk involvement. Estimation of these models revealed significant χ^2 values and unacceptable RMSEA values (greater than 0.10). In modifying the initial path models, we first reviewed the path coefficients and eliminated insignificant paths systematically (one path at a time). The overall fit of the revised models (models 9, 10, 11, and 12) was excellent (for all four models, $\chi^2/df < 1.6$, $p > 0.05$; CFI > 0.99 ; NNFI > 0.99 ; RMSEA < 0.03). The analysis revealed R^2 values of 0.30 for overall risk involvement, 0.14 for delinquency, 0.16 for substance use, and 0.30 for sexual risk behaviors.

The results of the path analysis indicate that youth disclosure in grades six and seven had long-term direct protective effects on adolescent delinquency in grade nine (model 10). Likewise, parental control in grades six and seven had long-term protective effects on substance use behavior in grade nine (model 11). However, parental knowledge, youth disclosure, parental solicitation and parental control only had indirect effects on adolescent sexual risk involvement through open and problematic parent-adolescent communication (model 12). Parent-adolescent communication (especially problematic communication) mediated the long-term effects of parental knowledge, youth disclosure, parental solicitation and parental control, overall and for each of the three types of risk behaviors.

Discussion

The results of the analysis conducted in the current study confirm and expand the findings of earlier studies. Low youth disclosure was found to be a significant longitudinal predictor of adolescent involvement in risk behaviors, particularly delinquent behavior, after accounting for parental knowledge and parent-adolescent communication (Keijsers et al., 2010; Kerr et al., 2010). Greater youth disclosure in grades six and seven was a predictor of reduced levels of overall risk involvement and delinquency in grade nine. In contrast to previous studies that have not found parental solicitation and control to be significant predictors of adolescent risk behavior (Keijsers et al., 2010; Kerr et al., 2010; Laird et al., 2010), our study shows that adolescents' perceptions of greater parental control are associated with lower levels of substance use, both concurrently and longitudinally. The effects of youth disclosure and

parental control operated independently of the extent to which parents were knowledgeable about their adolescents' activities. Furthermore, our study demonstrated that problematic parent–adolescent communication had a consistent influence on all three types of adolescent risk behaviors (i.e., delinquency, substance use and sexual risk behaviors).

The data used in the current study suggest that parents' direct control over adolescent behavior is as important as adolescents' voluntary disclosure of information about their activities in deterring adolescent problem behaviors (i.e., delinquency and substance use). Parents exercising control over adolescents' activities may reduce adolescents' opportunity and inclination to be involved in problem behaviors (Fletcher et al., 2004). However, parents' solicitation of information from youth is not directly associated with the three types of risk behaviors. In our longitudinal path models, parents' solicitation is positively associated with problematic communication but not with open communication. A possible explanation of this relationship is that adolescents might be reluctant to disclose their activities (especially if they are engaging in risk behaviors at baseline) and perceive their parents' efforts to obtain information about their activities as intrusive. Accordingly, parental solicitation leads not to increased communication but to adolescent resistance (Stettin & Kerr, 2000), which in turn could increase parent–adolescent communication problems.

Our data suggest that different components of “parental monitoring” influence different risk behaviors. Youth disclosure is both associated with and longitudinally predictive of lower levels of adolescent delinquency, suggesting that adolescents who freely disclose information about their activities to parents are more likely to reduce problem behavior in the future. Higher levels of parental control are associated with decreased substance use among adolescents. This effect is observed contemporaneously and longitudinally, suggesting that parents are more likely to actively oversee adolescents who are using alcohol and illicit drugs and that such monitoring does decrease the likelihood that they will use such substances in the future. These findings are consistent with those of a previous study (Fletcher et al., 2004) that suggest that youth disclosure and parental control differ in their impacts on substance use and delinquency. The differing longitudinal impacts of youth disclosure and parental control by type of risk behavior may reflect the differing trajectories of these behaviors. Substance use increases throughout adolescence, but delinquent behaviors increase most notably during early adolescence and remain relative steady throughout middle adolescence (Fletcher et al., 2004; Steinberg, 2004).

Our findings are not consistent with those of previous studies in which low levels of perceived parental monitoring were found to be associated with increased sexual risk behavior (Rai et al., 2003; Huebner & Howell, 2003). We did not find a direct association of parental knowledge, youth disclosure, parental solicitation or parental control with adolescent sexual risk involvement. The results of the path analysis suggest that parental knowledge, youth disclosure, parental solicitation and parental control only had indirect protective effects on adolescent sexual risk involvement through parent–adolescent communication. These findings may imply that parent–adolescent communication is a more powerful predictor of adolescent sexual-risk taking; the effects of parent–adolescent communication may overshadow the influences of youth disclosure and parental monitoring.

Future longitudinal studies using a more comprehensive set of parenting measures are needed to further examine the influences of youth disclosure and parental knowledge, solicitation and control on adolescent sexual risk involvement. The multiple-item scales of parental knowledge, youth disclosure, parental solicitation and parental control developed by Kerr et al. (2010) demonstrated high reliability and can be used in future studies.

There are several potential limitations of the current study. First, the measures of parental monitoring, parent–adolescent communication, adolescent sexual activity, and adolescent problem behaviors relied on self-reporting and are subject to self-reporting bias. It is possible that adolescents misreported or underreported their risk behaviors. Second, the measures of parental knowledge, youth disclosure, parental solicitation and parental control were extracted from a previously commonly used construct of “parental monitoring.” Although these measures are not as comprehensive as the measures used in several recent studies and may not fully capture parents’ monitoring activities and youth disclosure (Fletcher et al., 2004; Kerr et al., 2010), the items used in the present study are identical to some items used by Kerr et al. (2010). Third, although the construction of composite risk behavior scores is efficient in terms of identifying potential relationships among variables and is supported by a substantial body of literature that reports on the covariance among risk behaviors (Cottrell et al., 2007), future studies may explore these relationships in terms of individual risk behaviors. It is possible that specific risk behaviors may have different relationships with components of parental monitoring and communication. Fourth, recognizing that not all risk behaviors carry the same degree of risk, we arbitrarily assigned higher risk scores to certain behaviors (such as “selling or carrying drugs”). When we ran the path models using the variable weights and the same weights, the results were virtually identical. Thus, for clarity and ease of presentation, we elected to utilize the version in which we assigned the same weight to each risk behavior in constructing the composite scores for the three types of risk behaviors. This strategy of creating a composite score of risk behaviors without differential weighting is supported by the literature (Bornovalova et al., 2008). Moreover, all of the youth who engaged in the behaviors that might be considered of higher risk were also engaging in lower-risk behaviors and thus already had high composite scores (4–5) without weighting of the various risk behaviors. Finally, approximately 17% of the youth were lost to follow-up 36 months after intervention. We compared youths followed versus those lost to follow-up at year 3 and found no significant differences in demographic characteristics, parental monitoring, parent–adolescent communication or youth risk behaviors between the two groups, except for baseline differences in sexual experience, which was higher among those lost to follow-up (6.9% versus 2.6%, $p=0.005$). Although this one significant difference may indicate that the youth lost to follow-up were at somewhat higher risk, this would not impact the findings of the present analyses.

The strengths of this study include the use of long-term longitudinal data and the application of mixed-effects modeling and path analysis in the examination of the concurrent and prospective relationships of components of parental monitoring and communication and adolescent problem behavior and sexual risk engagement. This study demonstrated that, independent of parental knowledge, youth disclosure and parental control had long-term protective effects on adolescent problem behaviors and that parent–adolescent

communication had direct effects in deterring adolescent sexual risk involvement. These findings have significant implications for health promotion programs aimed at preventing adolescent risk behaviors. First, as problematic parent–adolescent communication predicts all three types of risk behaviors through early to middle adolescence, future “parental monitoring” interventions should focus on enhancing parents’ interpersonal skills in communication with their adolescents, in addition to teaching them how to engage in effective monitoring practices. Second, as parental knowledge, youth disclosure and parental control differ in their impacts on delinquency, substance use and sexual risk behaviors, future parental monitoring interventions should emphasize the differences and importance of the unique components of parental monitoring. Third, as problematic parent–adolescent communication had consistent influences on adolescent risk involvement, youth and their parents with problematic communication patterns might be an important subgroup for targeted adolescent risk reduction interventions. Finally, as many risk behaviors emerge and increase rapidly during early adolescence (between the ages of 10 and 14 years), this period is a critical time for prevention and early intervention (Liddle et al., 2004). At the same time, pre- and early adolescent children are less likely to think abstractly or plan for the future (Steinberg, 2005). Thus, interventions at this early age must recognize these development constraints and present hazards and decision making in a more immediate and direct cause-and-effect manner than might be suitable for older adolescents.

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Research highlights

- parental knowledge, youth disclosure and parental control differ in their impacts on three types of youth risk behaviors
- youth disclosure longitudinally predicts reduced delinquency and parental control predicts reduced substance use
- problematic parent-adolescent communication is consistently associated with increases in a wide range of risky behaviors
- parental solicitation has no direct effect on adolescent involvement in substance use, delinquency and sexual risk

Figure 1.

Path model showing the influence of youth-reported parental knowledge, youth disclosure, and parental solicitation and control during early adolescence on adolescent delinquency, substance use, and sexual risk involvement in mid-adolescence. Standardized path coefficients appear in the single-headed arrows connecting the variables. * $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

Table 1

Proportions of youth involved in risk behaviors at baseline, 12, 24, and 36 months

Risk behaviors	Baseline	12 months	24 months	36 months	z
Sample size	913	813	785	758	
Delinquent behaviors					
Was suspended from school	2.3%	4.1%	11.8%	16.4%	10.69 ^c
Was truant	4.3%	2.3%	3.9%	4.4%	0.27
Carried a weapon	3.9%	3.7%	5.0%	9.5%	4.79 ^c
Engaged in a fight	33.6%	23.1%	22.2%	24.5%	-4.45 ^c
Substance use behaviors					
Smoked cigarettes	2.2%	2.2%	2.9%	2.0%	0.14
Drank alcohol	18.9%	15.8%	19.2%	30.2%	4.27 ^c
Used marijuana	0.4%	1.1%	1.9%	3.0%	4.65 ^c
Sold or carried drugs	1.0%	0.8%	1.2%	2.1%	2.04 ^a
Was asked to sell drugs	1.7%	1.6%	2.4%	2.8%	1.66
Sexual behaviors					
Ever had sex	3.5%	12.1%	22.4%	31.0%	20.01 ^c
Ever had anal sex	0.6%	3.9%	8.2%	10.9%	14.03 ^c
Had multiple sex partners	0.2%	1.3%	3.3%	4.7%	8.11 ^c
Used a condom during last sexual encounter	33.3%	40.4%	56.0%	72.7%	5.04 ^c

Note:

^a $P < 0.05$;^c $P < 0.001$.

Table 2

Correlation coefficients of youth-reported "parental monitoring," parent-youth communication and youth involvement in sexual and other risk behaviors at baseline, 12, 24, and 36 months

Variables	1	2	3	4	5	6	7	8	9	Mean	SD
<i>Baseline (n=913)</i>											
Parental monitoring											
1. Parental knowledge	1									4.33	1.07
2. Youth disclosure	0.64 ^c	1								4.12	1.08
3. Parental solicitation	0.45 ^c	0.47 ^c	1							4.54	1.04
4. Parental control	0.44 ^c	0.50 ^c	0.47 ^c	1						4.18	1.36
Parent-youth communication											
5. Open communication	0.23 ^c	0.31 ^c	0.22 ^c	0.22 ^c	1					3.85	0.79
6. Problem communication	-0.03	-0.09 ^b	0.03	-0.06	0.08 ^a	1				3.37	0.77
Risk involvement											
7. Delinquent behaviors	-0.19 ^c	-0.17 ^c	-0.11 ^c	-0.16 ^c	-0.15 ^c	0.03	1			0.45	0.70
8. Substance use behaviors	-0.20 ^c	-0.16 ^c	-0.07 ^a	-0.15 ^c	-0.12 ^c	0.09 ^b	0.33 ^c	1		0.27	0.54
9. Sexual risk behaviors	-0.12 ^c	-0.12 ^c	-0.05	-0.10 ^b	-0.02	0.06	0.21 ^c	0.20 ^c	1	0.10	0.31
<i>12 months (n=813)</i>											
1. Parental knowledge	1									4.48	0.91
2. Youth disclosure	0.72 ^c	1								4.32	0.95
3. Parental solicitation	0.55 ^c	0.58 ^c	1							4.62	0.92
4. Parental control	0.42 ^c	0.51 ^c	0.46 ^c	1						4.17	1.26
5. Open communication	0.37 ^c	0.41 ^c	0.33 ^c	0.27 ^c	1					4.04	0.85
6. Problem communication	-0.08 ^a	-0.17 ^c	-0.05	-0.13 ^c	-0.18 ^c	1				3.22	0.88
7. Delinquent behaviors	-0.20 ^c	-0.19 ^c	-0.13 ^c	-0.18 ^c	-0.11 ^b	0.08 ^a	1			0.34	0.62
8. Substance use behaviors	-0.23 ^c	-0.23 ^c	-0.15 ^c	-0.20 ^c	-0.12 ^c	0.13 ^c	0.40 ^c	1		0.22	0.55
9. Sexual risk behaviors	-0.16 ^c	-0.19 ^c	-0.10 ^b	-0.10 ^b	-0.11 ^b	0.07 ^a	0.29 ^c	0.42 ^c	1	0.30	0.87
<i>24 months (n=782)</i>											
1. Parental knowledge	1									4.47	0.92

Variables	1	2	3	4	5	6	7	8	9	Mean	SD
2. Youth disclosure	0.79 ^c	1								4.26	0.99
3. Parental solicitation	0.57 ^c	0.56 ^c	1							4.57	0.95
4. Parental control	0.52 ^c	0.54 ^c	0.50 ^c	1						4.02	1.30
5. Open communication	0.34 ^c	0.39 ^c	0.27 ^c	0.29 ^c	1					3.93	0.91
6. Problem communication	-0.11 ^b	-0.15 ^c	-0.04	-0.12 ^c	-0.28 ^c	1				3.22	0.91
7. Delinquent behaviors	-0.25 ^c	-0.25 ^c	-0.15 ^c	-0.20 ^c	-0.15 ^c	0.16 ^c	1			0.41	0.71
8. Substance use behaviors	-0.24 ^c	-0.26 ^c	-0.16 ^c	-0.22 ^c	-0.13 ^c	0.17 ^c	0.35 ^c	1		0.28	0.63
9. Sexual risk behaviors	-0.18 ^c	-0.20 ^c	-0.18 ^c	-0.16 ^c	-0.13 ^c	0.15 ^c	0.26 ^c	0.31 ^c	1	0.59	1.15
<i>36 months (n=758)</i>											
1. Parental knowledge	1									4.46	0.85
2. Youth disclosure	0.74 ^c	1								4.28	0.91
3. Parental solicitation	0.56 ^c	0.52 ^c	1							4.63	0.85
4. Parental control	0.41 ^c	0.47 ^c	0.41 ^c	1						3.98	1.25
5. Open communication	0.25 ^c	0.38 ^c	0.21 ^c	0.23 ^c	1					3.90	0.93
6. Problem communication	-0.12 ^c	-0.15 ^c	-0.05	-0.14 ^c	-0.32 ^c	1				3.30	0.90
7. Delinquent behaviors	-0.32 ^c	-0.30 ^c	-0.21 ^c	-0.19 ^c	-0.11 ^b	0.16 ^c	1			0.52	0.88
8. Substance use behaviors	-0.27 ^c	-0.27 ^c	-0.17 ^c	-0.25 ^c	-0.19 ^c	0.14 ^c	0.53 ^c	1		0.40	0.71
9. Sexual risk behaviors	-0.20 ^c	-0.20 ^c	-0.14 ^c	-0.12 ^c	-0.13 ^c	0.08 ^a	0.31 ^c	0.29 ^c	1	0.78	1.27

Note:

^aP<0.05;^bP<0.01;^cP<0.001.

SD=standard deviation.

Table 3

Parameter estimates (standard errors) for mixed-effects models showing predictive factors for adolescent youth risk involvement from grade six to grade nine

Variables	Estimated models											
	Overall risk involvement			Delinquency			Substance use			Sexual risk		
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8	Model 9	Model 10	Model 11	Model 12
	β	SE	β	SE	β	SE	β	SE	β	SE	β	SE
<i>Fixed effect</i>												
Age	0.237	(0.065) ^c	0.231	(0.064) ^c	0.089	(0.025) ^c	0.088	(0.024) ^c	0.025	(0.022)	0.118	(0.038) ^b
Gender												
Female	-0.703	(0.085) ^c	-0.707	(0.084) ^c	-0.233	(0.032) ^c	-0.235	(0.032) ^c	-0.094	(0.030) ^b	-0.368	(0.050) ^c
Male (reference)												
Parental knowledge	-0.130	(0.039) ^c	-0.125	(0.039) ^b	-0.075	(0.019) ^c	-0.074	(0.019) ^c	-0.055	(0.015) ^c	-0.006	(0.023)
Youth disclosure	-0.147	(0.039) ^c	-0.123	(0.040) ^b	-0.050	(0.019) ^b	-0.040	(0.019) ^a	-0.049	(0.015) ^b	-0.054	(0.023) ^a
Parental solicitation	0.032	(0.033)	0.035	(0.033)	0.018	(0.016)	0.019	(0.016)	0.018	(0.013)	0.012	(0.019)
Parental control	-0.066	(0.023) ^b	-0.055	(0.023) ^a	-0.029	(0.011) ^a	-0.025	(0.011) ^a	-0.038	(0.009) ^c	-0.008	(0.014)
Open communication			-0.098	(0.034) ^b			-0.028	(0.016)			-0.043	(0.020) ^a
Problem communication			0.154	(0.033) ^c			0.065	(0.015) ^c			0.036	(0.019) ^a
Time 1	-0.948	(0.061) ^c	-0.965	(0.061) ^c	-0.072	(0.031) ^a	-0.078	(0.031) ^a	-0.139	(0.024) ^c	-0.739	(0.035) ^c
Time 2	-0.847	(0.061) ^c	-0.821	(0.061) ^c	-0.176	(0.031) ^c	-0.168	(0.031) ^c	-0.173	(0.024) ^c	-0.494	(0.035) ^c
Time 3	-0.432	(0.061) ^c	-0.415	(0.061) ^c	-0.108	(0.031) ^c	-0.102	(0.031) ^b	-0.119	(0.024) ^c	-0.206	(0.035) ^c
Time 4 (reference)												
<i>Random effect</i>												
Participant	1.092	(0.073) ^c	1.072	(0.072) ^c	0.106	(0.011) ^c	0.104	(0.011) ^c	0.117	(0.009) ^c	0.384	(0.025) ^c
School	0.009	(0.018)	0.008	(0.017)	0.001	(0.003)	0.001	(0.003)	0.002	(0.002)	0.003	(0.004)
Class (nested with school)	0.039	(0.028)	0.036	(0.027)	0.007	(0.004) ^a	0.007	(0.004) ^a	0.003	(0.003)	0.002	(0.006)

Notes:

^ap<0.05;
^bp<0.01;
^cp<0.001.
 SE=standard error.