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Do Parents and Peers Matter? A Prospective Socio-ecological Examination of Substance Use and Sexual Risk among African American Youth

Katherine S. Elkington, PhD¹, José A. Bauermeister, PhD², and Marc A. Zimmerman, PhD²

¹HIV Center for Clinical and Behavioral Studies, New York State Psychiatric Institute and Columbia University, New York, NY

²Health Behavior and Health Education, School of Public Health, University of Michigan, Ann Arbor MI

Abstract

We examined the direct contribution of parent and peer risk and promotive factors on youth condom use trajectories, in addition to the indirect influence of these factors via youth's substance use over four years in a sample of urban, African American youth ($N=679$; 51% female; $M = 14.86$ years; $SD=.65$). Growth curve modeling was used to estimate changes in substance use and sexual risk across adolescence and test their association with parent and peer factors. Parent and peer risk factors were strongly associated with increasing substance use as youth aged. Substance use and condom use were interrelated. Parent and peer *risk* factors were indirectly associated with youth condom use; parent and peer *promotive* factors were directly associated with condom use, after accounting for substance use. Findings suggest the value of considering multiple influences on youth risk behavior.

Keywords

African American youth; HIV/STI risk; parents; peers; substance use

Introduction

In the United States, African American youth are disproportionately affected by the HIV epidemic and demonstrate higher rates of sexually transmitted infections (STI) compared to White and Hispanic youth (Centers for Disease Control and Prevention [CDC], 2006; CDC 2008). Given the constant interplay between the youth and his or her context during adolescence (Schulenberg, Maggs, & Hurrelmann, 1997), understanding youth sexual behavior requires a theoretical lens that addresses the environmental and social contexts critical to the development of youth (Locke & Newcomb, 2008; Perrino, Gonzalez-Soldevilla, Pantin, & Szapocznik, 2000). A study that employs a broader theoretical framework to examine the cumulative effect of risk and promotive factors from multiple intersecting domains on youth sexual risk trajectories can therefore provide necessary data to inform much needed multilevel sexual risk reduction programs for African American youth. Consequently as a contribution to the literature, we sought to examine the following question: how do cumulative risk and promotive factors across multiple domains contribute

to sexual risk behaviors in African American youth, both directly and indirectly via their use of substances?

The broader context of risk: A conceptual model

The period between adolescence and young adulthood is a challenging developmental transition, characterized by immense biological, social and behavioral change (Dishion, Poulin, & Skaggs, 2000; Erikson, 1959; Schulenberg et al., 1997). It is during this period that the onset of sexual behavior and experimentation with substance use typically begins and escalates (Brooks-Gunn & Paikoff, 1997; Kandel, Yamaguchi, & Chen, 1992). Among numerous theories that have examined adolescent development and behavior (e.g. Jessor & Jessor, 1977; Hirschi, 1969; Catalano & Hawkins, 1996), Ecodevelopmental Theory (ET; Szapocznik & Coatsworth, 1999) posits that in order to understand adolescent risk behaviors, it is necessary to understand the interplay between risk *and* promotive factors within the interacting social systems in which these occur (Perrino et al., 2000). ET emphasizes the crucial role of family in the socialization of youth, and its ability to influence and be influenced by other social systems or domains such as peers, school and neighborhood (microsystems), the interaction between these domains (mesosystem), and the effect of broader social systems such as culture or political climate (macrosystems) on youth (Szapocznik & Coatsworth, 1999; Perrino et al., 2000). Given that family and peers are two of the most proximal and influential domains in youth's lives (Perrino et al., 2000; Szapocznik & Coatsworth, 1999), we examine the concurrent influence of family and peer risk and promotive factors on youth sexual risk behavior across adolescence, using ET as a guiding framework for this study. Furthermore, drawing from a resiliency theory (Ferguson & Zimmerman, 2005), we will examine several risk and promotive factors within each domain in order to understand the cumulative effects of these factors. Evidence suggests that examining single factors may not be sufficient to identify promotive or protective effects (Ostaszewski & Zimmerman, 2006). Below we outline key risk and promotive factors in these two domains identified from prior studies that we will include in our analytic model (see Figure 1).

The role of microsystems: Families, peers, and sexual behavior

Family and peers play an important role in the emotional and behavioral development of children and adolescents, including in the development of sexual behaviors (Buhi & Goodson, 2007; Repetti, Taylor, & Seeman, 2002). In particular, affective characteristics such as family involvement, cohesion, and parental support are integral to youth's development of healthy romantic or intimate relationships and practice of safer sexual behavior (Donenberg, Paikoff & Pequegnat, 2006). Close family relationships and involvement and parental support have been associated with more condom use, less exposure to risky situations, and later sexual onset in youth (Donenberg, Bryant, Emerson, Wilson, & Pasch, 2003; Perrino et al., 2000; Repetti et al., 2002; Teitelman, Ratcliffe, & Cederbaum, 2008). Conversely, youth who grow up in families characterized by overt family conflict, parental substance use or abuse, and who have neglectful or unsupportive family relationships are more likely to engage in risky behaviors, including substance abuse and risky sexual activity (Repetti et al., 2002; Donenberg et al., 2006).

Researchers have found that perceived peer norms and behavior are also strongly associated with risky sexual behavior. Youth engaged in risky sexual activity are more likely to be involved with a peer group who engages in that risky behavior, and to associate with peer groups who possess favorable attitudes toward sex or drug use (Bachanas et al., 2002; Bauermeister, Elkington, Brackis-Cott, Dolezal, & Mellins, 2009; Elkington, Bauermeister, Brackis-Cott, Dolezal, & Mellins, 2009). On the other hand, peers who are supportive, engage in prosocial behaviors, and whose norms support condom use and other safe sex

behaviors are associated with protective behaviors (e.g. reduced substance use, increased condom use) in youth (Buhi, & Goodson, 2007; Romer et al., 1994; Stanton et al., 2002).

Researchers that have examined the association of factors within both family and peer domains with adolescent sexual risk behavior have found conflicting results. Some cross-sectional studies have found that perceptions of peer sexual behavior and peer norms are better predictors of adolescent sexual behavior and condom use compared to parent disapproval and monitoring (Beal, Ausiello, & Perrin, 2001; Romer et al., 1994; Hampton et al., 2005; Elkington et al., 2009). In contrast, several studies have found that parental factors moderate the relationship between peer influence and youth sexual behavior (Dilorio, McCarty, Denzmore & Landis, 2007; Rai et al., 2003; Whitaker & Miller, 2000). For example, a study examining peer norms and parental monitoring found that the impact of peers' norms was a function of parental monitoring, such that greater parental monitoring substantially diminished the effect of peer influence on sexual activity (Rai et al., 2003). Similarly, a study of African American youth (Dilorio et al., 2007), found that, for girls, discussions about sex with mothers moderated the influence of sex-based discussion with peers on youth sexual behavior. These studies show youth rely on both peer and parent influence when determining attitudes about sexual behavior (Hampton et al., 2005). Yet, conflicting findings suggest need for further research. Furthermore, our understanding of how these two domains operate together or in opposition over time to either promote or reduce sexual risk as youth age has received less attention.

Researchers traditionally assumed that parents' influence on youth became negligible as peers or romantic partners became more salient during the youth's transition from adolescence into adulthood (Steinberg, 2000). Some researchers, however, have refuted this perspective. Despite generating new or stronger relationships with peers, adolescents remain connected to their parents for guidance and support as they continue to solidify their identity (Hair, Moore, Garrett, Ling, & Cleveland, 2008; Schulenberg et al., 1997; Steinberg, 2000). The effects of these interrelated relationships on sexual behavior across adolescence are less clear. As youth develop new primary relationships and move away from their parents and toward peers and romantic partners, their potential for engaging in sexual risk may increase due to potential involvement with high risk peer networks (Beal et al., 2001). Close parental monitoring and involvement, however, may reduce the likelihood of becoming involved in risky peer networks and subsequent risky behaviors (Rai et al., 2003; Brody et al., 2001). Alternatively, youth who experience impoverished family relationships and poor parenting may seek prosocial peer groups and therefore offset earlier risk (Kandel & Andrews, 1987).

Few researchers have examined prospectively the unique influence of both family and peer risk and promotive factors on sexual risk behavior. In a study that explored the link between neighborhood, family and peer level factors, and sexual onset in urban youth, Browning and colleagues (Browning, Leventhal & Brooks-Gun, 2004, 2005) found that, after considering neighborhood disadvantage and collective efficacy, family attachment and support was negatively associated with sexual onset whereas peer deviance was positively associated with sexual onset. In a study of urban, African American youth, Stanton et al. (2002), found peer factors (e.g. condom use, communication) were associated with condom use in early adolescence, whereas parental factors (monitoring and open communication) were more influential on youth condom use in late adolescence. Stanton and colleagues' (2002) study, however, examined the effect of specific baseline parent and peer factors on African American youth's behaviors overtime, precluding their ability to simultaneously examine changes over time and between individuals, and to comprehensively examine whether cumulative exposure of risk and promotive factors lead to increases in risk behavior across adolescence.

The individual micro-system: The influence of substance use

There is a strong association between substance use and risky sexual behavior in youth (Bachanas, Morris, Lewis-Gess, Sarett-Cuasay, Flores et al., 2002; Lowry et al., 1994; Tapert, Aarons, Sedlar, & Brown, 2001). The relationship between these behaviors is complex and likely not exclusively a causal association (Collins, Ellickson, Orlando, & Klein 2005). The same family and peer factors, such as family cohesion, peer delinquency, and parental and peer substance use, have been associated with both substance use and sexual risk behaviors among youth (Kung & Farrell, 2000; Liddle, 2004; Prado et al., 2007; Repetti et al., 2002). Considering the overlap between substance use and sexual risk behaviors, and the similar parent and peer risk and promotive factors that are associated with each, it is possible that substance use may mediate the association between parent and peers factors and sexual risk. Indeed, recent findings have suggested that individual-level factors may mediate the relationship between microsystem-level influences (e.g. parents and peers) and youth sexual behaviors (Dilorio, McCarty, & Denzmore, 2006; Elkington et al., 2009). Thus, we sought to examine if the family and peer factors that place youth at increased risk for engaging in risky sexual behaviors have an indirect effect on risk through the youth's use of substances.

Study objectives and hypotheses

Although evidence exists to suggest that African American youth are exposed to numerous risk factors, surprisingly little is known about how social environmental factors, particularly parent *and* peer domains, work to either promote or reduce sexual risks as these youth age (Dillon, Pantin, Robbins, & Szapocznik, 2008; Stanton et al., 2002). Higher rates of HIV/STI infection in African American youth may be due to differences in vulnerability to risk and promotive factors. In the context of neighborhood disintegration and poverty, African American youth are more likely than are European American youth to experience family structural disadvantage, parental absence, and larger households (Duncan, Brooks-Gunn, and Klebanov 1994; Haveman and Wolfe 1994; Browning et al., 2004; 2005). In these contexts, youth may have greater exposure to antisocial peer groups (Furstenberg et al. 1987; Lauritsen 1994). Given these differing socio-economic conditions, it is important to understand how promotive factors for sexual risk behaviors, such as affective characteristics of support and involvement, may offset or compensate for risk factors such as family conflict and parental or peer substance use in African American youth.

Thus, the present study contributes to research on HIV/STI risk behavior among African American youth in three critical ways: 1) we explore the influence of family and peer risk and promotive factors on trajectories of substance use across adolescence among African American youth. Prior studies of African American youth have typically examined distinct domains, or examined either promotive *or* risk factors (Beal et al., 2001; Henrich et al., 2006) at one point in time, an approach that does not consider the cumulative effects of both risk and promotive factors on behavior (Ostaszewski & Zimmerman, 2006); 2) we examine the direct effects of cumulative risk and promotive factors in both family and peer domains on youth condom use; and 3) we examine the indirect effects of family and peer risk and promotive factors on sexual risk behaviors via youth substance use in a sample of African American youth followed across adolescence. We hypothesize that 1) cumulative promotive factors will be associated with consistent condom use,; 2) risk factors will be associated with reduced condom use in either the peer or family domains; and 3) family and peer factors that place youth at increased risk for engaging in risky sexual behaviors will have an indirect effect on risk through the youth's use of substances (see Figure 1).

Methods

Sample

This study is based on an eight-year longitudinal study of youth from mid-adolescence to the transition into young adulthood. Data were collected from 850 adolescents beginning the ninth grade in one of four public high schools in Flint, Michigan. To be eligible for the study, participants had a grade point average of 3.0 or lower at the end of the eighth grade, were not diagnosed by the school as having emotional or developmental impairments, and were identified as African American, White, or Bi-racial (African American and White). Data for this report focuses on the first four Waves (e.g., the high school years). A more detailed description of our methods is published elsewhere (Zimmerman, Bernat, & Caldwell, 2002).

Adolescents self-reporting as African American constituted 80% percent of the original sample in Wave 1 ($n = 679$), we focus on the African American subsample in this study; 50.8% were female; and the mean age at Wave 1 for participants was 14.86 years ($SD = .65$).

Procedures

Participants in Waves 1–4 (i.e., 9th to 12th grades) received structured face-to-face interviews at one year intervals whether they were in or out of school; on average, each interview lasted 50–60 minutes. After the interview portion of the protocol, participants completed a self-administered paper-and-pencil questionnaire about alcohol and substance use, sexual behavior, and other sensitive information. We obtained a 90% response rate over the four Waves of the study; differences in key sociodemographic variables, substance use and sexual behaviors were not found between those who were retained in the study and those who dropped out (available from authors). Participants were given \$30 per assessment as remuneration for participating in the study. The University of Michigan's Institutional Review Board approved the study design and procedures (UM-IRB#H03-0001309).

Measures

We report the mean and standard deviation for all study measures over time in Table 1.

Wave 1 (fixed) Demographics—We asked participants to report their race, date of birth, and sex. Participants reported highest education and the occupations of both parents as a measure of socioeconomic status (SES). Most mothers completed high school/vocational training as their highest education level ($M = 4.40$, $SD = 1.88$) and most fathers completed some college ($M = 5.23$, $SD = 2.23$). Occupations were assigned a prestige score using Nakao and Treas' (1994) classification and rating scheme. The highest occupational group received a prestige score of 64.38 (professional), and the lowest group received a score of 29.28 (private household worker). If scores were available for both parents, the higher prestige score was used for analysis. Parents of youth were mostly “blue-collar” workers from local factories ($M = 39.81$; $SD = 10.48$).

Time varying covariates: Sexual risk behavior (outcome)—Participants self-reported their condom use over the previous year (How often have you used a condom when having sex in the last year?), responding with one of the following categories: 1=Almost never, 2=Not very often, 3=Half of the time, 4=Most of the time, and 5=Always. Participants also reported the number of sexual partners in their lifetime using an open-ended question format at Wave 1 (“How many partners have you had?”). For all other Waves, participants self-reported the number of sex partners in the past year by answering an open-ended question (“How many sex partners have you had in the last year?”). Participants reporting never having had sexual intercourse in their lifetime, or not having

had sex in a given Wave, were assigned a condom use value of 5 (i.e. always) and a value of 0 for number of partners. Results did not vary when only sexually active youth were included in the analysis.

Indices of composite risk and promotive factors—Using procedures similar to those by other researchers (Bowen & Flora, 2002; DeWit, Silverman, Goodstadt, & Stoduto, 1995; Newcomb & Felix-Ortiz, 1992), we created risk and promotive factor indices. Risk and promotive factors were selected from two domains that represented parental/familial and peer influences, respectively, and were informed by previous work on sexual risk behavior in youth (Donenberg et al., 2006; Perrino et al., 2000; Repetti et al., 2002; Teitelman et al., 2008; Bachanas et al., 2002; Bauermeister et al., 2009; Beal et al., 2001; Elkington et al., 2009). To create the risk and promotive composite factors, respectively, we standardized the original items and then created a mean standardized value for each risk and promotive score.

Youth microsystem: Substance use—Alcohol and marijuana use were measured with the same well established questions employed by Monitoring the Future, a large, national longitudinal study of behaviors, including substance use, attitudes, and values of American secondary school students, college students, and young adults (Johnston, O'Malley, & Bachman, 2003). The frequency of alcohol use and marijuana use over the past 30 days, respectively, was measured using a 7-point Likert scale (0 = 0 times; 1=1–2 times; 2=3–5 times; 3=6–9 times; 4=10–19 times; 5=20–39 times; 6 = 40+ times). We standardized the original items and created a mean standardized value for youth's alcohol and marijuana use.

Family microsystem: Promotive factors—We used two primary constructs as indicators of promotive factors within the family: parental support and family involvement. Parental support was an abbreviated version of Procidano & Heller's scale (1983). It was a five item scale including the statements (1) “My parents enjoy hearing about what I think,” (2) “I rely on my parents for emotional support,” (3) “My parents are good at helping me solve problems,” (4) “I have a deep sharing relationship with my parents,” and (5) “My parents encourage me to stay in school.” For each of these five items, participants indicated their level of agreement on a scale from 1 (Not True) to 5 (Very True). After Wave 1, the wording of these items changed from “parents” to “mother,” in order to more specifically measure maternal support. Family involvement was assessed through 3 items: (1) “Family members make the rules together,” (2) “Parents and children in our family discuss together the method of punishment,” and (3) “Each family member has at least a part in major family decisions.” Participants reported the level of frequency with which each of these items described their family on a scale from 1 (Hardly ever) to 4 (Often).

Family microsystem: Risk factors—We included youths' reports of parent drug use and conflict in the family as indicators of family risk. Participants responded to seven questions pertaining to the substance use behaviors of their primary parent or guardian. Questions required participants to rate the frequency that they have known this person to “drink beer or wine,” “drink hard liquor (gin, whisky, etc.),” “get drunk,” “get high or stoned on drugs,” “smoke marijuana this past year,” have “been busted for driving while high on alcohol or other drugs,” and have “been busted for using or having drugs.” Response categories ranged from (1) Never to (5) Very Often. Family conflict was assessed through a five item measure, where participants rated how much they thought each of the following statements described their family: “We fight in our family,” “Family members get so angry they throw things,” “Family members lose their tempers,” “Family members criticize each other,” and “Family members hit each other in anger.” Respondents indicated their level of agreement on a four-level scale from 1 (Hardly ever) to 4 (Often).

Peer microsystem: Promotive factors—We accounted for two peer promotive factors: friend support and friends' involvement in prosocial activities. Support from friends was examined through a five item social support scale that was similar to the parent measure described previously (Procidano & Heller, 1983). Participants rated, on a scale from 1 (Not True) to 5 (Very True), how much each of the items described their “feelings and experiences in your relationships with your friends.” These 5 items were (1) “I rely on my friends for emotional support,” (2) “My friends come to me for emotional support,” (3) “My friends are good at helping me solve problems,” (4) “I think that my friends feel that I’m good at helping them solve problems,” (5) “My friends give me the moral support I need.” To assess friend’s prosocial involvement, participants were asked the number of friends they have who “go to church regularly,” “take part in school clubs or athletics,” “get all A or B grades,” and “plan to go to college.” Response categories ranged from 1(None) to 5 (All).

Peer microsystem: risk factors—Peer influences included two risk factors: friends' substance use and friends' delinquent behavior. For friends' substance use, participants responded to six items regarding the number of friends they believed “have a drug or alcohol problem,” “smoke marijuana at least once a month,” “have used cocaine,” “have used drugs at school,” “have been busted for selling drugs,” and “have been busted for having drugs.” Response categories ranged from 1 (None) to 5 (All). Friends' delinquent behavior was measured through five items following the same format as the drug-use battery. These items asked the number of friends participants believed “get into fights,” “have carried a knife or a razor,” “have carried a gun,” “shoplift from stores,” and “have been busted for burglary or robbery.”

Data analytic strategy

We used HLM 6.08 (SSI, 2005) for our growth curve model analyses. This approach has several strengths for data in longitudinal survey studies. While a repeated measures regression performs list-wise deletion for cases with missing values in one or more data points, HLM maximizes all available data by employing an Expectation-Maximization (EM) algorithm if participants do not have information across all Waves when computing growth curve estimates (Raudenbush & Bryk, 2002). Similar to repeated measures regression, multilevel modeling also allows the total variance to be divided into within-individual (Level One Model; i.e., change over time) and between-individual (Level Two Model; i.e., person-centered characteristics like sex) variation.

We modeled youth substance use over time using an age-centered approach (i.e., change in substance use for every year increase across adolescence after age 14). After modeling the linear growth of substance use, we explored whether any non-linear trends in substance use were present. The linear time coefficient estimated the constant change in substance use over time, and the nonlinear growth estimates approximated the mean acceleration or deceleration of substance use over time. If the intercept (i.e. mean substance use at age 14) or any growth term varied between individuals, we explored whether person-centered characteristics (e.g., sex and SES) explained substance use over time (Model 1). We then tested whether youth’s substance use was associated with the risk and promotive factor indices in a stepwise fashion. We first entered the family risk and promotive scores, followed by the peer influence indicators.

We repeated the same analytic strategy to model youth’s condom use over time (see Table 3). We also entered youth’s number of sexual partners as a predictor into the equation, in order to adjust for differing risk levels of condom use (e.g., condom use with one partner over time is different than condom use with four partners over time). Using this approach,

we found results did not vary when only sexually active youth are included in the analysis (available from authors).

To understand the *total* influence of parent and peer influences on condom use, we employed a path analytic strategy to examine their direct association over time (i.e. main effects model) on condom use, as well as their indirect association over time via substance use (i.e., indirect effects model). Similar to traditional path analysis, we computed these indirect effects (IE) by multiplying statistically significant coefficients (i.e. indicating a statistically-significant association between a parental or peer factor and substance use over time), by the coefficient estimating the association between substance use and condom use over time. For brevity, we included only statements for statistically significant findings. Results are presented to be consistent with the three study objectives described in the Introduction.

Results

The influence of family and peer factors on trajectories of substance use across adolescence

In order to examine the direct and indirect effects of family and peer factors on youth sexual risk behavior, we examined the direct association between parent and peer factors and substance use. Table 2 presents the stepwise growth models of the association of family and peer factors on trajectories of alcohol and marijuana use in our sample.

Base model—On average, youth reported limited substance use at age 14 ($b\pi_{00}$; see Table 2). Baseline substance use score decreased for every unit increase in household SES ($b_{01} = -0.01$; $p < .05$). We found no sex differences in substance at age 14.

We applied a linear ($b\pi_{10} = 0.41$; $p < .01$) and quadratic ($b\pi_{20} = -0.06$; $p < .05$) term to estimate the change in substance use across adolescence. As shown in Figure 2, substance use increased across adolescence, yet the magnitude of this linear association decreased as youth grew older. When we examined whether the change in substance use varied across person-centered characteristics, we found males reported greater linear change in substance use than did females across adolescence ($b_{11} = -0.17$; $p < .05$). We found no other differences by person-centered characteristics.

Inclusion of family—We then entered the family risk and promotive factors into the substance use growth model (see Table 2, Model 2). Given that both family indicators used the same metric (i.e., z-score), we were able to compare the relative magnitude of each in the model. Family risk factors had a stronger correlation with substance use than did the family promotive factors. Substance use over time was associated with more family risk ($b\pi_{40} = 0.22$; $p < .001$), and less family promotive behavior ($b\pi_{30} = -0.04$; $p < .05$). After accounting for family variables, the initial baseline differences in substance use disappeared. We found no differences by person-centered characteristics in the associations between substance use and family indicators.

Inclusion of peers—When we included the peer risk and promotive scores into the model (see Table 2, Model 3), we found increases in substance use across adolescence were associated with higher scores in the peer risk indicator ($b\pi_{60} = 0.24$; $p < .01$). We found no association between peer promotive factors and youths' substance use over time, or differences by person-centered characteristics. Furthermore, after accounting for the peer indicators, we found the relationship between family promotive factors and substance use disappeared.

The direct effects of both family and peer domains on youth condom use

Next, we established the direct association between parent and peer factors and consistent condom use. We then examined the indirect effects of parent and peer factors on consistent condom use by examining this association after adjusting for youth substance use. Table 3 presents the stepwise, multilevel growth models of the association of family and peer risk and promotive factors and youth substance use on trajectories of condom use in our sample.

Base model—Youth who were sexually-active at age 14 reported using condoms most of the time ($b\pi_{00} = 4.10$; $p < .001$), with greater condom use reported if sexually-active youth were females ($b_{01} = .21$; $p < .05$) or had higher SES ($b_{02} = .02$, $p < .01$).

Consistent condom use was modeled best with a linear and quadratic term (see Figure 3). Youth's condom use increased linearly across the adolescent years ($b\pi_{00} = 0.55$; $p < .01$), but the magnitude of this association decreased as youth grew older ($b\pi_{20} = -.08$; $p < .05$). Furthermore, youth's condom use decreased across adolescence for every additional partner reported over time ($b\pi_{30} = -0.05$; $p < .001$).

When we examined whether these temporal relationships varied by person-centered characteristics, we found the linear slope of condom use differed by sex and SES. Females were less likely than males to use condoms across adolescence ($b_{11} = -0.37$; $p < .12$). Condom use also decreased if youth came from higher SES households ($b_{12} = -0.02$, $p < .006$). We found no differences by sex or SES on the quadratic growth term or the number of partners covariate.

Inclusion of family—Consistent condom use was associated with family risk and promotive factors (see Table 3, Model 2). Family promotive factors had a stronger association with youth's condom use than did the family risk factors. Consistent condom use was associated with less family risk ($b\pi_{50} = -0.06$; $p < .05$) and more family promotive behaviors ($b\pi_{40} = 0.11$; $p < .001$). We found no differences by sex or SES in the association between condom use and the family indicators.

Inclusion of peers—Consistent condom use was associated with peer risk and promotive factors (see Table 3, Model 3). Peer risk factors had a stronger association with youth's condom use than the peer promotive factors. Condom use across adolescence was associated with the less peer risk behavior ($b\pi_{70} = -0.08$; $p < .01$), and more peer promotion behavior ($b\pi_{60} = 0.06$; $p < .05$). After accounting for the peer indicators, we found the relationship between family risk and condom use disappeared. The family promotive factor, however, remained associated with more condom use over time ($b\pi_{40} = 0.08$, $p < .01$). We found no differences by sex or SES in the associations between condom use and the peer indicators.

Inclusion of substance use—As a final step, we included youth's substance use score into the growth curve model (Table 3, model 4). Youth who reported greater substance use across adolescence were less likely to report consistent condom use over time ($b\pi_{80} = -0.10$; $p < .05$). Youth condom use remained associated with more family ($b\pi_{40} = 0.08$; $p < .05$) and more peer promotive factors ($b\pi_{60} = 0.06$, $p < .05$). We found no differences by sex or SES in the associations between condom use and substance use.

The indirect effects of family and peer factors on sexual risk behaviors via youth substance use

As a final step in our analysis, we constructed a path analysis, including both the direct effects of parental and peer promotive and risk effects on condom use, and their indirect effects via substance use (see. Fig 4). As noted above, youth's condom use across

adolescence was associated with a greater number of cumulative family and peer promotive factors. While we did not find a direct association between family and peer risks and condom use, we found an indirect, negative association over time for family risk ($IE = -0.018$) and peer risk ($IE = -0.024$) via substance use. Notably, the indirect effect of peer and parental risks on youth condom use over time depended on the reported amount of substance use over time.

Discussion

Overall, condom use decreased as youths aged, reflecting national trends (CDC, 2008b). We also found, expectedly, that the number of sexual partners in our sample increased over time. Most concerning, however, is the finding that condom use decreased with every additional partner youth reported. While we cannot discern if youth partners represented concurrent or serial partners, reduced condom use frequency with greater number of partners may increase HIV/STI risk.

The relatively high frequency of condom use in the current sample (i.e. most of the time or always) is consistent with prior research that shows frequent condom use among urban African American youth (DiClemente et al., 1996; Stanton et al., 2002; Bachanas et al., 2002) and national studies that find higher rates of condom use in African American youth compared to their White counterparts (CDC, 2008b). These findings, however, are puzzling given the disproportionate rate of HIV/STI infection for African American youth (CDC, 2006, 2008a). Our data may highlight the importance of context (e.g. neighborhood or location) in understanding these trends. Flint, Michigan, the location of the current study, is a city that has experienced widespread economic decline following the collapse of the auto industry. Youth in this context may have developed specific strengths and resiliency (Fergus & Zimmerman, 2005) in order to offset risk and successfully navigate their environment; these strengths may translate into safer sex skills and behaviors. This finding thus underscores the importance of examining the role of neighborhood disadvantage within specific communities and its potential relationship to patterns of risk behavior, and points toward tailored community interventions (Bauermeister, Zimmerman, & Caldwell, in press; Browning et al., 2004, 2005). Future research examining how community context may shape African American youth's interpersonal relationships with parents and peers is warranted as it may strengthen the development and implementation of HIV prevention strategies for this population.

Our finding that alcohol and marijuana use increased across adolescence is consistent with prior research of African American, White and Hispanic youth (Johnston et al., 2003), as is our finding that health-compromising behaviors (i.e. sex risk, substance use) were closely interrelated (Bachanas, Morris, Lewis-Gess, & al., 2002; Bailey, Pollock, Martin, & Lynch, 1999; Ford & Norris, 1994). These findings highlight the need to understand the role substance use may play, alongside social contextual influences (i.e. parents and peers), in affecting youth sexual behavior (Donenberg, Emerson, & King, 2006; Elkington et al., 2009; Elkington, Bauermeister, & Zimmerman, 2010).

Peer risk factors (i.e., substance use, delinquent behavior) and family risk factors (i.e., parental substance use, family conflict) were strongly associated with increasing substance use as youth aged (Table 2, model 3). These findings are consistent with prior research of African American and other youth (Fisher, Eke, Cance, Hawkins, & Lam, 2008; Rosenblum et al., 2005), particularly studies finding a strong relationship with parent or peer substance use, and substance use in youth (Locke & Newcomb, 2008). Conversely, parent and peer promotive factors were not associated with youth substance use. The absence of an effect for promotive factors is inconsistent with prior longitudinal studies of youth substance use

(Newcomb & Felix-Ortiz, 1992). Our findings may reflect that, for African American youth, the presence of risk factors in multiple domains offsets the potential for promotive factors to reduce substance use. Alternatively, the absence of promotive effects may be due to the lack of sensitivity in our measures, or the specific indicators included in our cumulative promotive indices for both parents and peers. Future research replicating our analytic approach is warranted in other samples of African American youth in order to better understand how an array of cumulative risk and promotive factors across numerous domains influence risk behavior during adolescence.

In contrast to substance use, when examining the direct effects of family and peer factors on trajectories of youth condom use, we found that peer (i.e., prosocial behavior, peer support) and family (i.e., family involvement, parental support) promotive factors were strongly associated with increased condom use. This suggests that these two social systems interact in vital ways. Prior work has tended to view families as a positive influence, protecting the youth from the negative influences of peers (Cooper & Cooper, 1992). Our findings, however, suggest that peers also exert positive or promotive influences on youth behavior (Henrich et al., 2006). Furthermore, substance use did not affect the promotive effects of parent and peer promotive factors on condom use. These findings suggest a compensatory model of resiliency for African American youth because parent and peer promotive factors may counteract the deleterious effects of negative social influences and substance use on youth condom use (Fergus & Zimmerman, 2005). Furthermore, findings underscore that, as in other populations, adolescence for African American youth is best viewed as a period during which the parent-child relationship still matters, even in the context of increasingly important peer relationships (Hair et al., 2008; Pires & Jenkins, 2007). Consequently, interventions that enhance positive development, prosocial friendships, and positive youth-parent relationships may be instrumental in offsetting other risk factors and reducing sexual risk behavior (Gavin, Catalano, & Markham, 2010).

Our path analysis revealed that the influence of parent and peer risk factors on youth condom use was shaped through youth substance use; however, we found no indirect effects of parent and peer promotive factors via substance use on youth condom use. This suggests that African American youth who reside in households with conflicting family relationships and evidence of parental substance use, and who also associate with peers that use substances and engage in delinquent behavior are more likely to use substance use, and may be less likely to use condoms. These findings have two implications for informing safer sex interventions. First, they suggest that a focus on reducing youth substance use as a strategy to increase condom use may be beneficial (Elkington et al., 2010; Locke & Newcomb, 2008; Prendergast, Urada, & Podus, 2001). This is consistent with others who have noted that condom use decision-making and negotiation is compromised while under the influence of substance use (Logan, Cole, & Leukefeld, 2002). Second, these results suggest that efforts to reduce exposure to, and to manage parent and peer risk factors that are indirectly associated with youth sexual well-being, particularly alcohol and marijuana use, may also help reduce youth sexual risk behavior.

Limitations

Several limitations of this study should be noted. These results may only be generalizable to youth who reside in economically-disadvantaged urban centers. Nevertheless, this is an important population to understand because disadvantage is related to many negative health outcomes and youth living in these areas are often the focus of prevention programs. Our results can help inform assets and resources in disadvantaged, urban youth's lives that could be the focus of programs designed to prevent risks for HIV/AIDS. Second, the predictors examined in the present study accounted for moderate amounts of variance in substance use and condom use across adolescence. One reason for this may be that we included relatively

few measures of risk and promotive factors in our cumulative measures. Other contextual factors associated with youth sexual risk behavior, including parent-child communication, parental monitoring, and peer sexual risk behavior norms (Buhi & Goodson, 2007) might be useful to include in future research. Researchers, however, have noted that moderate amounts of variance may have a significant influence on outcomes (Abelson, 1985). Third, behavioral data were based on self-report. It is possible that the prevalence of inconsistent condom use, alcohol and marijuana use was under-reported in this sample (Henrich et al., 2006; Tourangeau, Rips, & Rabinski, 2000). However, despite the potential for under-reporting of behaviors, we were still able to detect meaningful relationships between variables of interest (i.e. these relationships would be stronger if data were not under-reported).

Conclusions

These limitations notwithstanding, this study builds on our knowledge of how family and peer factors, in addition to youth substance use, each influence sexual risk behavior across adolescence. As in other studies, risk behaviors (i.e. substance use and inconsistent condom use) in the current study did not occur in isolation. In order to achieve an ecological understanding of youth risk behavior, individual risk behaviors cannot be examined individually nor targeted separately in interventions. Several promising programs that focus on both youth sexual risk behavior and substance use have recently been developed (Francoise, Rowe, Colon-Perez, DiClemente, & Liddle, 2009; Thurstone, Riggs, Klein, & Mikulich-Gilbertson, 2007), but more work needs to be done in order to establish their efficacy with a variety of youth populations.

Our findings underscore the need to consider family and peer risk and promotive factors over time. Although family and peer domains have emerged as prominent focal points for sexual risk prevention intervention programs for youth (Jemmott et al., 2000; Pantin, Schwartz, Sullivan, Prado, & Szapocznik, 2004), few intervention programs directly address *both* of these domains. Our study suggests that greater emphasis must now be placed on broader ecological models of behavior to understand how *both* risk and promotive factors across several domains influence youth risk behavior. Such an understanding is necessary in order to develop comprehensive interventions that may have greater success in achieving sustained risk reduction in youth.

Finally, while several cross-sectional studies of family and peer influence on sexual risk exist (e.g. (Locke & Newcomb, 2008; Rai et al., 2003; Romer et al., 1994; Rosenblum et al., 2005), longitudinal data that examine both these domains are rare, particularly among African American youth. The use of growth curve analysis allowed us to examine the predictors (e.g. family and peer risk and pro motive factors) as time-varying, which offers a more accurate depiction of the dynamic and fluid nature of these factors across adolescence and underscored the importance of considering multiple influences in youth sexual risk behavior. While peer relationships typically become increasingly important across adolescence, our findings suggest that parents also continue to exert positive and promote influences throughout this developmental period. Interventions seeking to reduce risk and promote sexual health by targeting peer and family domains may wish to consider repeated reinforcement of promotive factors within both of these domains as youth age.

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Figure 1.
Conceptual Model

Figure 2.
Growth Curve Model for Alcohol and Marijuana Use across Adolescence

Figure 3.
Growth Curve Model for Condom Use across Adolescence

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Table 1

Descriptive Statistics of Study Variables across Adolescence (n=679)

Variables	Wave 1		Wave 2		Wave 3		Wave 4	
	M (SD)	α	M (SD)	α	M (SD)	α	M (SD)	α
Parental support ¹	4.07 (0.90)	0.8 3	4.15 (0.83)	0.8 2	4.23 (0.81)	0.8 4	4.16 (0.87)	0.87
Family Involvement ¹	2.31 (0.83)	0.6 6	2.15 (0.84)	0.7 6	2.19 (0.85)	0.7 7	2.12 (0.83)	0.76
Parental Substance Use ²	1.23 (0.39)	0.7 3	1.22 (0.42)	0.7 4	1.23 (0.43)	0.7 1	1.22 (0.42)	0.77
Family Conflict ²	1.73 (0.66)	0.7 7	1.66 (0.63)	0.8 0	1.57 (0.60)	0.8 1	1.57 (0.60)	0.82
Peer Support ³	3.11 (0.96)	0.8 2	3.33 (0.97)	0.8 7	3.28 (0.94)	0.8 7	3.24 (0.98)	0.90
Peer Prosocial ³	2.90 (0.81)	0.6 4	2.86 (0.85)	0.7 3	2.79 (0.83)	0.7 5	2.77 (0.85)	0.77
Peer Substance Use ⁴	1.54 (0.64)	0.7 9	1.76 (0.70)	0.8 0	1.68 (0.71)	0.8 3	1.69 (0.68)	0.84
Peer Delinquency ⁴	1.91 (0.78)	0.7 5	1.92 (0.78)	0.7 8	1.75 (0.71)	0.7 8	1.73 (0.73)	0.81
Youth Alcohol Use ⁵	0.98 (1.50)	-	1.15 (1.58)	-	1.21 (1.72)	-	1.36 (1.70)	-
Youth Marijuana Use ⁵	0.97 (1.70)	-	1.49 (2.06)	-	1.51 (2.15)	-	1.55 (2.16)	-
Youth Number of Partners	2.10 (3.21)	-	1.89 (2.70)	-	2.02 (2.94)	-	1.85 (2.26)	-
Youth Condom Use	4.49 (1.06)	-	4.45 (1.08)	-	4.30 (1.17)	-	4.05 (1.29)	-

¹ Variables were include in the family promotive index² Variables were include in the family risk index³ Variables were include in the peer promotive index⁴ Variables were include in the peer risk index⁵ Variables were include in the youth alcohol and other drug index

Table 2
Growth Curve Model for Youth Alcohol and Marijuana Use across Adolescence

	Model 1		Model 2		Model 3	
	b(se)	p	b(se)	p	b(se)	p
Base, π_{00}	-0.32(.15)	*	-0.20(.15)		-0.22(.14)	
Sex, b_{01}	0.13(.09)		0.06(.09)		0.08(.09)	
SES, b_{02}	-0.01(.004)	*	-0.007(.004)		-0.006(.004)	
Linear, π_{10}	0.41(.12)	**	0.39(.12)	**	0.36(.12)	**
Sex, b_{11}	-0.17(.07)	*	-0.17(.07)	*	-0.16(.07)	*
SES, b_{12}	0.006(.004)		0.006(.004)		0.006(.004)	
Quadratic, π_{20}	-0.06(.03)	*	-0.06(.03)	*	-0.06(.03)	*
Sex, b_{21}	0.02(.02)		0.02(.01)		0.02(.02)	
SES, b_{22}	-0.001(.001)		-0.002(.001)		-0.002(.001)	
FAM P π_{30}			-0.04(.02)	*	-0.02(.02)	**
FAM R π_{40}			0.22(.02)	***	0.18(.02)	**
PEER P π_{50}					-0.02(.02)	
PEER R π_{60}					0.24(.03)	**

FAM P = family promotive index

FAM R = family risk index

PEER P = peer promotive index

PEER R = peer risk index

* $p \leq .05$,

** $p \leq .01$,

*** $p \leq .001$

Table 3

Growth Curve Model for Youth Condom Use across Adolescence

	Model 1		Model 2		Model 3		Model 4	
	b(se)	p	b(se)	p	b(se)	p	b(se)	p
Base, π_{00}	4.1(.22)	***	3.99(.22)	***	4.03(.22)	***	3.99(.22)	***
Sex, b_{01}	0.27(.13)	*	0.34(.13)	**	0.31(.13)	*	0.33(.13)	*
SES, b_{02}	0.02(.005)	**	0.01(.005)	**	0.01(.005)	*	0.01(.005)	*
Linear, π_{10}	0.55(.19)	**	0.56(.19)	**	0.55(.19)	**	0.60(.19)	**
Sex, b_{11}	-0.37(.12)	**	-0.38(.12)	**	-0.38(.12)	**	-0.40(.12)	***
SES, b_{12}	-0.02(.006)	*	-0.01(.006)	*	-0.01(.01)	*	-0.01(.006)	*
Quadratic, π_{20}	-0.08(.04)	*	-0.08(.04)	*	-0.08(.04)	*	-0.08(.04)	*
Sex, b_{21}	0.04(.03)		0.04(.03)		0.04(.03)		0.04(.03)	
SES, b_{22}	0.003(.001)		0.003(.001)		0.003(.001)		0.002(.001)	
Partners, π_{30}	-0.05(.01)	***	-0.05(.009)	***	-0.04(.009)	***	-0.04(.009)	***
FAM P, π_{40}			0.11(.03)	***	0.08(.03)	**	0.08(.03)	**
FAM R, π_{50}			-0.06(.03)	*	-0.04(.03)		-0.03(.03)	
PEER P, π_{60}					0.06(.03)	*	0.06(.03)	*
PEER R, π_{70}					-0.08(.03)	**	-0.05(.03)	**
Substance Use, π_{80}							-0.10(.03)	**

FAM P = family promotive index

FAM R = family risk index

PEER P = peer promotive index

PEER R = peer risk index

* $p \leq .05$,** $p \leq .01$,*** $p \leq .001$