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Optimizing Assessment of Risk and Protection for Diverse Adolescent Outcomes: Do Risk and Protective Factors for Delinquency and Substance Use Also Predict Risky Sexual Behavior?

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Abstract
Assessments of youth risk and protective factors (RPFs) for substance use, delinquency, and violence have been used by communities to identify priorities and target them with prevention interventions. These same RPFs may also predict other youth problems. This study examined the strength and consistency of relationships of 41 ecological RPFs that predict antisocial behavior and substance use with sexual behavior outcomes in a sample of 2150 urban youth in 10th and 12th grade. After adjusting for controls, findings identify significant associations among the majority of community, school, family, peer, and individual risk factors, and family, peer, and individual protective factors, with sexual behavior outcomes, specifying unique associations among multiple factors with risky sex relative to both safe sex and not being sexually active. Prevention programming that targets common predictors for multiple problems may address a broad array of outcomes, including sexual health risk behaviors.

Keywords Risk factors · Protective factors · High-risk sexual behavior · Adolescents

Introduction

Predictors of adolescent problems are often called risk factors if they are associated with an increase in the likelihood of problems and protective factors if they are directly or indirectly associated with a reduction in problems (O'Connell 2009). Prior research has identified common risk and protective factors

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for youth substance use, delinquency, and violence across multiple domains, including community, family, school, peer, and individual (Catalano et al. 2012; Herrenkohl et al. 2011; Pollard et al. 1999). Assessing these factors can guide community-based prevention efforts in identifying existing levels of risk and protection for a broad set of outcomes (Hawkins 1999) and addressing elevated risk or depressed protective factors with evidence-based prevention programs and policies that address these priorities (Fagan and Catalano 2013).

The current study examines a set of established risk and protective factors for substance use, delinquency, and violence and examines to what extent they are also associated with risky adolescent sexual behavior, safe sex, and pregnancy and sexually transmitted infections (STIs). Establishing such relationships would bolster the promise of prevention and youth development programs to prevent a more diverse set of problem behaviors by targeting common predictors, potentially broadening the efficiency of prevention programming.

A Need to Include Predictors of Sexual Risk in Community Studies

By 12th grade, nearly one half of all youth in the USA report having had sexual intercourse (Kann et al. 2016). A normal part of adolescent development involves learning to make

decisions about engaging in sex; however, many youth are engaging in risky sexual practices, such as sex with multiple partners or inconsistent use of methods to prevent pregnancy or STIs. The Centers for Disease Control and Prevention's 2015 Youth Risk Behavior Survey reports that among sexually active youth, 43% stated not having used a condom the last time they had sexual intercourse and 14% reported using no method of birth control at all. Further, more than 11% reported having sexual intercourse with four or more partners (Kann et al. 2016).

Risky sex places youth in danger of STIs and early pregnancy, each of which has short- and long-term social, economic, and health consequences. Half of the 19 million new cases of STI each year in the USA are diagnosed among youth ages 15 to 24 (Eaton et al. 2012). STIs have been associated with multiple negative health outcomes, including genital and other cancers, infertility, death, and higher risks of both reinfection and new infections (Fortenberry et al. 1999), as well as psychological difficulties associated with infection (Erbelding et al. 2001). Risky sexual behavior among adolescents can also result in early pregnancy; in the USA, nearly a quarter million births annually occur to women between the ages of 15 and 19, a rate of 24 births per 1000 females (Hamilton et al. 2015). Teenage parenthood is associated with multiple long-term negative outcomes, including reduced income and education (Fletcher and Wolfe 2009), negative mental health outcomes (Biello et al. 2010), and lower life satisfaction for the parents (Lipman et al. 2011), as well as increased risk of substance use, unemployment, and early parenthood among their children (Pogarsky et al. 2006).

Assessing Common Predictors of Multiple Outcomes

Given the consequences associated with risky sexual behavior among adolescents and the need to develop efficient and effective prevention programming for a wide array of behavioral outcomes, it is vital to understand risk and protective factors associated with risky sexual behavior and whether existing prevention models for other outcomes may be useful in their identification. Risky sexual behavior is often associated with other problematic behaviors among adolescents (Capaldi 2014). Prior research has consistently found strong relationships between risky sex and delinquency (Lansford et al. 2014), substance use (Staton et al. 1999; Thurstone et al. 2013), and violence (Rodgers and McGuire 2012). These relationships may be sequential, where problem behaviors such as delinquency and substance use predict later risky sexual behavior, or co-occurring, wherein these behaviors happen within a shared timeframe (Guo et al. 2002; Staton et al. 1999; Thurstone et al. 2013).

The consistent associations between risky sexual behaviors and other problem behaviors may indicate that these outcomes share some causal factors. Some theories of problematic behavior describe causal factors across environmental and individual domains that prompt multiple, covarying behavioral outcomes among youth. Theories, such as problem behavior theory, describe behavioral risk outcomes as overlapping due to their placement within an adolescent social ecology, wherein youth learn and experience patterns of risk behaviors simultaneously (Jessor 1991). The causal factors thus describe risk and protection relative to the influence of environmental contexts and individual standards of behavior with problem behavior arising from the confluence of risk and dearth of protection. Originally used to describe patterns of delinquency and substance use, theories of overlapping adolescent behavioral outcomes, such as problem behavior theory and the social development model, have since been applied to a broader range of behavioral and health outcomes, including risky sexual behavior, depression, and obesity (Bond et al. 2005; Jessor 2014; Williams et al. 2015).

Some evidence for shared prediction of risky sex with other behavioral outcomes has been observed among studies that have examined small sets of predictors. Ludwig and Pittman (1999) found that an individual's prosocial values and self-efficacy were not only associated with delinquency and substance use, but risky sexual behavior as well. Some peer-level predictors, such as affiliation with deviant peers, also have been found to increase both delinquency and risky sex (Lansford et al. 2014). Similarly, general family environment predicted the shared variance among substance use, criminal involvement, and sexual risk behavior (Bailey et al. 2011). Further, several prevention systems designed for the reduction of delinquency and substance use have discovered secondary effects of reducing risky sexual behavior and its associated consequences. Multiple studies of the Seattle Social Development Project have found extended effects of a primary school social-development intervention on later risky sexual behavior and STIs, with some effects continuing to age 30 (Hill et al. 2014; Lonczak et al. 2002). The drug and delinquency prevention programs Project ALERT, Life Skills Training, and Multidimensional Treatment Foster Care found similar results at reducing risky sexual behavior and outcomes in adolescence and young adulthood (Ellickson et al. 2009; Griffin et al. 2006; Kerr et al. 2009). The effects of these programs in reducing risky sexual behavior through the targeting of risk and protective factors for delinquency and substance use suggest that some of these outcomes share predictors with risky sex.

Exploring which of the predictors of substance use, delinquency, and violence also associate with risky sexual behavior could create a pragmatic and efficient approach for community assessment of risk and protective factors. This study examines associations between risky sexual behavior and multiple measures from an established survey of risk and protective factors that previously have been found to predict delinquency, violence, and substance use among adolescents. Further,

this study examines these factors relative to their associations with both safe and risky sex, in comparison to not being sexually active and to each other, to provide further examination of the types, patterns, and magnitude of ecological predictors unique to risk behavior. Establishing that some of these factors are also associated with risky sex will broaden both the number of tools available to assess risk and protection for risky sex and the utility of existing tools in predicting a more diverse set of problematic outcomes.

Methods

Participants

The current study examined data from 2150 public school students who participated in the Evidence2Success Youth Experience Survey (E2S-YES). Evidence2Success is a prevention system that assists communities in measuring and prioritizing community levels of risk, protection, and youth outcomes with the goal of helping the community to select effective evidence-based prevention programs to address that community's priority needs (Fagan and Eisenberg 2012). The data for this study come from a survey that was administered to students in grades 10 and 12 in an urban northeastern American city public school system in 2012. Data collection procedures relied on passive parent consent and were approved by the UW IRB and the school district's Office of Research, Planning & Accountability. Parents were informed about the survey through a written information sheet mailed to each home and an automated school district phone call and were offered the opportunity to opt their children out of participation. The survey was proctored by trained classroom teachers in schools on dates determined by the school district, and make-up survey dates were scheduled when completion was below 85%. The analytic sample for this study includes 1150 10th graders and 1000 12th graders from eight public high schools, representing 75 and 78% of eligible students, respectively. Of this sample, 48.4% were male. This sample was ethnically and racially diverse, with 54.4% identifying as either Hispanic, Spanish, or Latino; 15.6% as Black or African American; 8.9% as White; 7.3% as Asian or Pacific Islander; 1.1% as Native American or Alaskan Native; 6.3% as multiracial or biracial; and 6.2% as "other." Surveys were available to students in both English and Spanish, with 1.1% of surveys taken in Spanish.

Measures

The Youth Experience Survey was designed to measure adolescent wellbeing outcomes in five areas: positive relationships (e.g., close to parents, peers), behavior (e.g., delinquency, risky sexual behavior), education (e.g., school grades, suspensions), emotional well-being (e.g., symptoms of depression and anxiety), and physical health (e.g., chronic health problems). The survey adopted multiple measures of risk and protective factors in the community, school, family, peer, and individual domains, most from the Communities That Care (CTC) Youth Survey, a brief, reliable, and valid self-report instrument widely used to assess community-wide levels of risk, protection, and behavior problems among adolescents in the USA and internationally (Arthur et al. 2002; Glaser et al. 2005; Hemphill et al. 2011; Oesterle et al. 2012). The survey was augmented to include measures of other outcomes and risk factors from existing measures (see Tables 1 and 2). Like the CTC survey, the E2S-YES was designed to assist the community in identifying and prioritizing for preventive intervention elevated risk and depressed protection among youth as a component of the community's prevention program planning efforts.

Outcomes

We examined two categories of outcomes: sexual behaviors and pregnancy/STI.

Risky Sex Respondents were asked the following questions: "Have you ever had sexual intercourse? (By sexual intercourse we mean vaginal or anal sex)." During the past year: "How often did you or your partner use any form of birth control when you had vaginal intercourse?"; "How often did you or your partner use a condom?"; and "With how many people have you had sexual intercourse?" A variable was created that includes categories of individuals who were not sexually active, individuals who engaged in risky sex, and individuals who engaged in safe sex. Risky sex was defined as inconsistently (reporting any response other than "always") using birth control or condoms or having two or more sexual partners in the past year. Prior studies (e.g., Cocchio et al. 2018; Valois et al. 1999) have found more frequent risk behaviors and negative outcomes such as STIs among adolescents and young adults with two or more sexual partners. The present definition is thus intended to broadly capture risk behavior by setting a stringent definition for safe sex.

Pregnancy/STI Respondents were asked "In the past year (12 months), have you been told by a doctor or nurse that you had a sexually transmitted disease or infection such as chlamydia, gonorrhea, syphilis, genital herpes, hepatitis, or HIV/AIDS?"; "How many times have you been pregnant or gotten someone pregnant?"; and "How many children have you given birth to or fathered?" A dichotomous variable was created to identify if the respondent had ever experienced a pregnancy or had an STI in the past year.

Table 1 Evidence2Success Youth Experience Survey risk factors

Factor	Source	Number of items	Example item	Alpha
Community				
Low neighborhood attachment	CTC	3	*I'd like to get out of my neighborhood.*	0.80
Community disorganization	CTC[a]	6	*I feel safe in my neighborhood.*	0.85
Transitions and mobility	CTC	4	*How many times have you changed homes since kindergarten?*	0.51
Perceived availability of drugs	CTC	4	*If you wanted some cigarettes, how easy would it be for you to get some?*	0.87
Perceived availability of guns	CTC	1	*If you wanted to get a handgun, how easy would it be for you to get one?*	–
Perceived racial discrimination	SSDP[a]	3	*Do you think it will be harder for you to get ahead in life because of your race?*	0.67
Family				
Poor family management	CTC	8	*The rules in my family are clear.*	0.81
Family conflict	CTC	3	*We argue about the same things in my family over and over.*	0.81
Household adults involved in antisoc. beh.	CTC[a]	6	*In the past year, how many adult family members who live with you have smoked cigarettes?*	0.72
Parental attitudes favoring drug use	CTC	3	*How wrong do your parents feel it would be for you to smoke marijuana?*	0.76
Parental attitudes favoring antisoc. beh.	CTC	3	*How wrong do your parents feel it would be for you to steal something worth more than $5?*	0.77
School				
Academic failure	CTC	2	*Putting them all together, what were your grades like last year?*	0.64
Low commitment to school	CTC	7	*How interesting are most of your school subjects to you?*	0.76
Past-grade retention	SSDP[a]	1	*Have you ever been held back a year in school (repeated a grade)?*	–
Peer-Individual				
Rebelliousness	CTC	3	*I ignore rules that get in my way.*	0.76
Early initiation of antisoc. beh.	CTC	4	*How old were you when you first got suspended from school?*	0.55
Early initiation of drug use	CTC	4	*How old were you when you first smoked marijuana?*	0.72
Low perceived risk of drug use	CTC	4	*How much do you think people risk harming themselves (physically or in other ways) if they smoke marijuana regularly?*	0.89
Interaction with antisocial peers	CTC	6	*In the past year, how many of your best friends have carried a handgun?*	0.80
Friends' use of drugs	CTC	4	*In the past year, how many of your best friends have smoked cigarettes?*	0.79
Friend(s) involved in gangs	CTC	1	*In the past year, how many of your best friends have been members of a gang?*	–
Victim of repeated aggression	STR	4	*Think about how often these things have happened to you during the past year. A student or group of kids teased and said mean things to me.*	0.82
Dating violence	YRBS[a]	1	*During the past year, did your boyfriend or girlfriend ever hit, slap, or physically hurt you on purpose?*	–
Work > 20 h a week	CYDS	1	*On average over the school year, how many hours per week do you work in a paid job?*	–

CTC = Communities That Care; SSDP = Seattle Social Development Project; STR = Steps to Respect; YRBS = Youth Risk Behavior Survey; antisoc. beh. = antisocial behavior.

[a] = item or scale is modified or adapted from the original source

Risk and Protective Factors

Tables 1 and 2, respectively, show the 24 risk and 17 protective factors by domain that were included in the survey, with the original source of the measure, the number of items included within the measure, an example item, and the associated Cronbach's alpha levels, if applicable. Although the majority of measures come from the Communities That Care Youth Survey, additional measures (see Table 1) were selected to assess a more diverse set of risk and protective factors. These measures were taken from Seattle Social Development Project surveys (Hawkins et al. 1992), the evaluation of the Steps to Respect Program student survey (Low et al. 2011), the Youth Risk Behavior Surveillance System (YRBS; Kann 2001), the Community Involvement and Collective Efficacy Survey (Sampson et al. 1997), the Patterns of Adaptive Learning Study (Midgley et al. 2000), and Steinberg's measure of Parental Involvement in Schooling (Steinberg et al. 1992).

Table 2 Evidence2Success Youth Experience Survey protective factors

Factor	Source	Number of items	Example item	Alpha
Community				
Opportunities for prosocial involvement	CTC[a]	7	*There are lots of adults in my neighborhood I could talk to about something important.*	0.77
Recognition for prosocial involvement	CTC	3	*There are people in my neighborhood who encourage me to do my best.*	0.87
Collective efficacy	Sampson et al. 1997	4	*People around here are willing to help their neighbors.*	0.77
Family				
Family attachment	CTC[a]	4	*Do you feel very close to your mother (or the person who is like a mom to you)?*	0.75
Opportunities for prosocial involvement	CTC	3	*If I had a personal problem, I could ask my parents (or caregivers) for help.*	0.86
Rewards for prosocial involvement	CTC	4	*My parents (or caregivers) notice when I am doing a good job and let me know about it.*	0.73
Parental use of pos. disc. strategies	SSDP	3	*When you have misbehaved do your parents (or caregivers) listen to your side?*	0.60
Parental involvement in education	Steinberg et al. 1992	5	*My parents (or caregivers) help with homework when I ask.*	0.76
School				
Opportunities for prosocial involvement	CTC	5	*Teachers ask me to work on special classroom projects.*	0.66
Rewards for prosocial involvement	CTC	4	*My teachers praise me when I work hard in school.*	0.68
Academic self-efficacy	Midgley et al. 2000	5	*I'm certain I can master the skills taught in class this year.*	0.89
Peer-Individual				
Clear standards for behavior	CTC[b]	4	*I think sometimes it's okay to cheat at school.*	0.55
Interaction with prosocial peers	CTC	5	*In the past year, how many of your best friends have tried to do well in school?*	0.66
Social skills	CTC	4	*You are at a party at someone's house, and one of your friends offers you a drink containing alcohol. What would you say or do?*	0.50
Prosocial involvement	CTC	3	*How many times in the past year have you participated in clubs, organizations, or activities at school?*	0.69
Rewards for prosocial involvement	CTC	3	*What are the chances you would be seen as cool if you worked hard at school?*	0.69
Days physically active	YRBS	1	*During the past 7 days, on how many days were you physically active for a total of at least 60 min per day?*	–

CTC = Communities That Care; SSDP = Seattle Social Development Project; STR = Steps to Respect; YRBS = Youth Risk Behavior Survey; pos. disc. = positive discipline.

[a] Item or scale is modified or adapted from the original source

[b] In Arthur et al. (2002), named "Belief in the Moral Order"

Most measures were either 4- or 5-point scales and generally showed good reliability. Some items were minimally adapted to more accurately account for the characteristics of the urban sample and are noted in the tables.

Demographic Variables and Covariates

A number of covariates were included in the analyses to account for demographic variation that may moderate the relationships of the risk and protective factors with risky sexual behavior and consequences. Age and highest level of parental education (did not graduate high school, high school diploma, and college diploma or higher) were included as continuous variables, while gender, living in a two-parent household (including any biological, step, foster, or adoptive parents), foster care or juvenile justice involvement, and grade were included as dichotomous variables. Race (White, Black, Hispanic or Latino, Asian, Native American, multi- or biracial, and other) and language spoken at home (English, Spanish, other language) were included as categorical variables.

Data Analyses

Point-biserial correlations of both risky sex and safe sex with risk and protective factors were examined in comparison to individuals who were not sexually active by using dichotomous indicators for each outcome. Next, sequential

multinomial regressions determined associations between both risky sex and safe sex, relative to not being sexually active and to one another, with each risk or protective factor. Multinomial regressions are indicated so that distinctions can be made between associations unique to risk behavior apart from those that may be more generally associated with sexual behavior. Logistic regressions were used to examine associations of each factor with pregnancy/STI. All models controlled for age, gender, grade, race, previous foster care and/or juvenile justice involvement, language spoken at home, number of parents at home, and parental education. The adjusted odds ratios presented indicate the effect of an increase of one unit of each risk and protective factor on outcomes of sex behavior and pregnancy/STI when adjusted for covariates. As existing research has identified differential levels of adolescent risk behavior by gender (Kann et al. 2016), as well as gender differences among predictors of risky sexual behavior (Schuster et al. 2013), interaction terms of gender by risk or protective factor were then included in the models to investigate possible differential relationships between these factors and the outcomes by gender. To account for false discovery when conducting multiple sequential significance tests, p values were adjusted for each outcome within domains of risk and protection using the Benjamini-Hochberg procedure (Benjamini and Hochberg 1995). All analyses were conducted in MPlus 7.0 (Muthén and Muthén 2012).

Missing Data

Missing data were addressed using Full-Information Maximum Likelihood (FIML). The number of missing responses per item generally increased toward the end of the survey as some students likely ran out of time. An additional variable indicating the proportion of the survey completed was included as an additional auxiliary variable in the correlation analyses to help adjust for missing responses.

Results

In the analytic sample, 42% (30% of 10th graders and 55% of 12th graders) reported having had sexual intercourse in the past year. Twenty-three percent of 10th graders (19% of females and 30% of males) and 45% of 12th graders (45% of females and 46% of males) engaged in some form of risky sexual behavior. Of risky sex indicators, 17% of 10th and 12th graders had sex with two or more partners in the past year, 24% used inconsistent birth control, and 23% had inconsistent condom use. Among 10th graders, 7% (8% of females and 5% of males) had safe sex in the past year, and among 12th graders, 10% had safe sex (9% of females and 11% of males).

Approximately 4% of 10th graders (4% of females and 3% of males) and 11% of 12th graders (13% of females and 9% of

males) experienced either an STI or a pregnancy, with 3% of all 10th and 12th graders reporting an STI and 6% of 12th graders reporting a pregnancy. Due to the low prevalence of pregnancy/STI among 10th graders, these analyses were limited to 12th graders. Two risk factors, dating violence and working more than 20 h a week, also had low prevalence (i.e., less than 10% of the sample) and are not included in these analyses. Correlational and regression analyses included 22 risk factors and 17 protective factors.

Risk Factors

Table 3 presents the correlation coefficients and adjusted odds ratios for each risk factor and its association with each outcome. The adjusted odds ratios shown control for demographic variation and are presented with 95% confidence intervals for the main effects, as well as indicators of significant gender by risk/protective factor interactions. Significant, low to moderate zero-order correlations ($r = .10$ to .42) were observed between risky sex and all the risk factors except low neighborhood attachment. Similarly, nearly all risk factors were significantly associated with pregnancy/STI. Of the 22 risk factors, 12 from across the four domains were significantly and positively correlated with safe sex.

When accounting for covariates in multinomial regression models, nearly all risk factors in all four domains were significantly and positively associated with risky sex, in comparison to not being sexually active. Exceptions to this were low neighborhood attachment, perceived racial discrimination, and victim of repeated aggression, which were nonsignificant. In the same models, fewer than half (9 of 22) of the risk factors were associated with safe sex, indicating that most risk factors had no effect on the odds of individuals engaging in safe sex over not being sexually active. For example, rebelliousness increased the odds of individuals engaging in risky sex (AOR = 1.65, $p < .001$), but did not significantly increase the odds of individuals engaging in safe sex (AOR = 1.09, ns), suggesting that the association of rebelliousness with sexual behavior is specific to risk behavior. Comparing the strength of association of risk factors for risky sex and safe sex, 13 risk factors more strongly predicted risky sex than safe sex, indicating that these risk factors more strongly associate with sexual risk behavior than with sexual behavior more generally. For example, an increase of one unit of poor family management increased the odds of risky sex over safe sex by 64% (AOR = 1.64, $p < .05$). All risk factors in the school, peer, and individual domains, as well as four of the 11 risk factors from community and family domains, were also significantly associated with increased odds of pregnancy/STI in logistic regression models.

Interaction terms of gender by risk factor were added to the regression models to assess potential gender variation among the predictors. Only one risk factor interaction with gender

Table 3 Correlations and adjusted odds ratios between sexual behavior outcomes and risk factors

Risk factor	Risky sex								Pregnancy/STI		
	Safe sex (referent: not sexually active)			Risky sex (referent: not sexually active)			Risky sex (referent: safe sex)				
	r	AOR	95% CI	r	AOR	95% CI	AOR	95% CI	r	AOR	95% CI
Community											
Low neighborhood attachment	−0.01	0.92	(0.72–1.17)	0.06	0.95	(0.82–1.10)	1.03	(0.81–1.33)	0.11	1.17	(0.87–1.58)
Community disorganization	0.06	1.06	(0.78–1.44)	0.22***	1.59***	(1.32–1.93)	1.51*	(1.09–2.08)	0.16*	1.52*	(1.05–2.22)
Transitions and mobility	0.15***	1.57*	(1.10–2.26)	0.22***	1.73***	(1.38–2.18)	1.10	(0.76–1.60)	0.18***	1.36	(0.87–2.11)
Perceived availability of drugs	0.29***	1.78*	(1.41–2.24)	0.42***	2.21***	(1.90–2.58)	1.24	(0.98–1.59)	0.25***	1.67*	(1.23–2.28)
Perceived availability of guns	0.19***	1.46**	(1.18–1.82)	0.30***	1.60***	(1.39–1.85)	1.10	(0.89–1.36)	0.21***	1.55*	(1.22–1.97)
Perceived racial discrimination	0.10*	1.09	(0.77–1.56)	0.12***	1.05	(0.84–1.32)	0.96	(0.67–1.39)	−0.04	0.89	(0.56–1.42)
Family											
Poor family management	0.13**	1.35	(0.94–1.95)	0.32***	2.22***	(1.76–2.80)	1.64*	(1.12–2.39)	0.12*	1.44	(0.92–2.25)
Family conflict	0.16***	1.43*	(1.09–1.88)	0.18***	1.43***	(1.21–1.70)	1.00	(0.75–1.33)	0.12	1.17	(0.83–1.66)
Household adults involved in antisoc. beh.	0.10	1.53	(0.94–2.50)	0.26***	2.60***	(1.92–3.52)	1.69*	(1.06–2.71)	0.25***	2.48*	(1.55–3.98)
Parental attitudes favoring drug use	0.04	0.95	(0.63–1.43)	0.18***	1.61***	(1.28–2.01)	1.69*	(1.12–2.55)	0.12*	1.18	(0.80–1.75)
Parental attitudes favoring antisoc. beh.	0.02	0.74	(0.46–1.18)	0.12***	1.49**	(1.17–1.89)	2.02*	(1.25–3.27)	0.09	1.25	(0.82–1.90)
School											
Academic failure	0.09	1.28	(0.91–1.80)	0.26***	1.94***	(1.58–2.39)	1.52*	(1.07–2.17)	0.19***	1.80*	(1.17–2.75)
Low commitment to school	0.17***	1.45*	(1.06–1.99)	0.30***	2.16***	(1.77–2.63)	1.52*	(1.07–2.05)	0.18***	1.70*	(1.16–2.48)
Past grade retention	0.08	1.24	(0.66–2.33)	0.24**	1.59* [M]	(1.09–2.33)	1.28	(0.67–2.43)	0.25***	2.85*	(1.39–5.84)
Peer and individual											
Rebelliousness	0.05	1.09	(0.81–1.47)	0.23***	1.65***	(1.39–1.97)	1.52*	(1.12–2.05)	0.19***	1.51*	(1.08–2.11)
Early initiation of antisoc. beh.	0.13**	1.24	(1.02–1.50)	0.36***	1.68***	(1.49–1.89)	1.36**	(1.13–1.64)	0.33***	1.94*	(1.54–2.43)
Early initiation of drug use	0.21***	1.39***	(1.20–1.60)	0.42***	1.76***	(1.59–1.94)	1.27**	(1.10–1.46)	0.30***	1.48*	(1.25–1.76)
Low perceived risk of drug use	0.00	1.03	(0.78–1.35)	0.17***	1.62***	(1.38–1.90)	1.58**	(1.19–2.09)	0.20***	1.47*	(1.07–2.02)
Interaction with antisocial peers	0.10*	1.44*	(1.08–1.92)	0.33***	2.10***	(1.75–2.52)	1.46*	(1.10–1.93)	0.34***	2.18*	(1.64–2.90)
Friends' use of drugs	0.18***	1.39**	(1.14–1.70)	0.36***	1.87***	(1.64–2.13)	1.34*	(1.09–1.65)	0.24***	1.57*	(1.21–2.03)
Friend(s) involved in gangs	0.09*	1.29*	(1.09–1.53)	0.26***	1.46***	(1.31–1.63)	1.13	(0.96–1.33)	0.28***	1.56*	(1.29–1.89)
Victim of repeated aggression	0.00	1.16	(0.62–2.15)	0.10***	1.35	(0.94–1.96)	1.17	(0.62–2.20)	0.18***	2.69*	(1.46–4.94)

***$p < .001$

**$p < .01$

*$p < .05$

[M] Significantly larger effect size among males

Note: antisoc. beh. = antisocial behavior. Correlation and multinomial logistic regression results for risky sex include 10th and 12th graders; correlation and logistic regression results for pregnancy/STI include 12th graders only. Adjusted odds ratios control for gender, age, race, language spoken at home, parental education, foster care or juvenile justice placement, and living in a two-parent home. Regression p values reflect Benjamin-Hochberg adjustments for multiple testing

was significant. Past-grade retention had significantly stronger effects for males in relation to risky sexual behavior as compared to not being sexually active (AOR = 3.66, $p < 0.01$), indicating that males who had ever been held back a grade had substantially greater odds of risky sexual behavior in comparison with similar females.

Protective Factors

Table 4 presents the results of correlation and regression analyses for each protective factor and its association with each outcome. For the zero-order correlation results, in general, protective factors were not as consistently correlated with the outcomes as were the risk factors. With risky sexual behavior, more than half of all protective factors were significantly correlated, but only 6 of 17 were associated with safe sex and 6 with pregnancy/STI. Most of these protective factors were in the predicted negative direction, indicating that more protection is associated with less risky sex, less pregnancy and/or STI, and less safe sex. However, exercise (days physically active) held a positive association with both risky sex and safe sex. All family protective factors were significantly correlated with risky sexual behavior, and more than half of all peer and individual protective factors were significantly correlated with each of the three outcomes. In contrast, few community and school protective factors showed significant relationships with risky sex or pregnancy/STI.

In regression models, the majority of protective factors (9 of 17) were significantly associated with risky sex and indicate that, with respect to these factors, an increased level of protection is associated with a reduction in risky sexual behavior in comparison to not being sexually active. Most family and school protective factors were significantly associated with risky sex, as were half of all peer and individual-level protective factors. However, no protective factors were significantly associated with safe sex in comparison to not being sexually active. Two factors, social skills and clear standards for behavior, had significantly lower odds ratios for risky sex in comparison to safe sex. Predictors of pregnancy/STI were more domain-specific; a majority of peer and individual-level protective factors were significantly associated with pregnancy/STI, but among school, family, and community domains only collective efficacy was significant. When testing gender interactions, only days physically active had a significant interaction effect, increasing the odds of risky sexual behavior over not being sexually active more greatly among males (AOR = + 1.20, $p < 0.01$).

Discussion

Results of this study indicated associations between most of the E2S-YES risk and protective factors in the community, family, peer, and individual domains and adolescent risky sexual behavior. All significant associations were in the predicted directions, with risk factors related to increased odds of risky sexual behavior and protective factors having the expected negative associations (with the exception of physical activity and risky sex for males). Many of these factors were further associated with teen pregnancy and/or STIs. The study also

found that these relationships were largely consistent by gender. Although previous research has suggested more widespread differences by gender in the relationship between risky sexual behavior and its antecedents, the current study found little evidence of substantial variation. Future research should continue to examine gender differences among levels of risk and protection and their pathways toward various outcomes in order to further understand possible gender moderation.

This study identified factors that were more strongly associated with risky sex than with safe sex, as well as factors that were associated with both outcomes and thus indicate an association with any sexual behavior relative to not being not sexually active. For example, academic failure is not associated with an increase in odds of safe sex, but is associated with an increase in risky sex (AOR = 1.94, $p < .001$), while transitions and mobility were associated with both outcomes, with no significant difference in association between the outcomes. The differences in both association and magnitude indicate a specificity to risk factors of sexual risk behavior that exists apart from factors associated with sexual behavior in general. Thus, future research examining models of sexual risk behavior can use results from this study as an initial guide for the identification of factors, such as academic failure, that uniquely or more strongly associate with risk behavior than with sexual behavior more broadly.

Although many protective factors were found to be associated with these outcomes, these associations were smaller than risk factor associations and less consistently significant across domains. This study identified multiple important protective factors in the domains of family, peer, and individual, but few in the community and school domains. Studies of predictors of other problematic youth outcomes suggest that some protective factors may operate most effectively as moderators in the presence of risk (Lösel and Farrington 2012). A recent study using a similar set of risk and protective factors observed that protective factors were indeed more effective at reducing youth violence when the youth had higher levels of cumulative risk (Kim et al. 2016). More research is needed to explore the domain-specific and interactional effects of these risk and protective factors on risky sexual behavior. For example, although it was expected to have a protective effect, days physically active was associated with significantly greater odds of risky sex for males. Such results may be due to the type of physical activities engaged in facilitating males' opportunities for social interaction, but more research is needed to continue evaluating the risk profiles and pathways through which this and other protective factors may guard against risky sexual behavior outcomes.

These findings have important implications for both research and prevention programming. The theory and evidence base suggest that risk and protective factors for delinquency, substance use, and violence may be used to understand other behaviors, including risky sex (Bailey 2009; Ellickson et al.

Table 4 Correlations and adjusted odds ratios between sexual behavior outcomes and protective factors

Protective factors	Risky sex								Pregnancy/STI		
	Safe sex (referent: not sexually active)			Risky sex (referent: not sexually active)			Risky sex (referent: safe sex)				
	r	AOR	95% CI	r	AOR	95% CI	AOR	95% CI	r	AOR	95% CI
Community											
Opportunities for prosocial involvement	−0.02	0.99	(0.73–1.33)	−0.04	0.93	(0.77–1.12)	0.94	(0.68–1.30)	−0.05	0.91	(0.60–1.36)
Rewards for prosocial involvement	−0.04	1.00	(0.80–1.27)	−0.05	0.93	(0.80–1.08)	0.93	(0.72–1.20)	−0.08	0.85	(0.61–1.17)
Collective efficacy	0.02	1.07	(0.86–1.35)	−0.11***	0.85	(0.73–0.98)	0.79	(0.62–1.00)	−0.20**	0.61*	(0.45–0.84)
Family											
Family attachment	−0.02	1.01	(0.73–1.38)	−0.16***	0.72**	(0.59–0.88)	0.72	(0.52–1.00)	−0.05	0.86	(0.59–1.27)
Opportunities for prosocial involvement	−0.13	0.73	(0.56–0.95)	−0.15***	0.76**	(0.65–0.90)	1.04	(0.79–1.37)	0.03	1.22	(0.88–1.69)
Rewards for prosocial involvement	−0.09	0.83	(0.62–1.11)	−0.18***	0.70***	(0.59–0.84)	0.85	(0.63–1.16)	−0.04	1.02	(0.70–1.48)
Parental use of pos. disc. strategies	−0.13**	0.79	(0.58–1.07)	−0.20***	0.70***	(0.58–0.85)	0.88	(0.64–1.21)	−0.05	0.98	(0.68–1.41)
Parental involvement in education	−0.07	0.88	(0.58–1.35)	−0.15***	0.79	(0.61–1.03)	0.90	(0.58–1.40)	−0.12	0.89	(0.51–1.56)
School											
Opportunities for prosocial involvement	−0.12*	0.61	(0.41–0.92)	−0.05	0.78	(0.60–1.01)	1.27	(0.83–1.94)	−0.05	0.85	(0.51–1.41)
Rewards for prosocial involvement	−0.14**	0.65	(0.45–0.92)	−0.12***	0.70**	(0.56–0.87)	1.08	(0.75–1.56)	−0.06	0.82	(0.53–1.27)
Academic self-efficacy	0.04	1.00	(0.80–1.25)	−0.03	0.83*	(0.72–0.94)	0.82	(0.65–1.04)	−0.01	1.03	(0.78–1.37)
Peer and Individual											
Clear standards for behavior	−0.13**	0.67	(0.46–0.97)	−0.31***	0.37***	(0.29–0.47)	0.55*	(0.38–0.81)	−0.22***	0.42*	(0.26–0.67)
Interaction with prosocial peers	−0.05	0.94	(0.75–1.17)	−0.20***	0.69***	(0.60–0.79)	0.74	(0.59–0.93)	−0.26***	0.61*	(0.46–0.81)
Social skills	−0.17***	0.66	(0.47–0.93)	−0.37***	0.35***	(0.28–0.44)	0.53***	(0.37–0.76)	−0.30***	0.37*	(0.24–0.56)
Prosocial involvement	0.08	1.07	(0.95–1.21)	−0.02	0.93	(0.86–1.01)	0.87	(0.77–0.99)	−0.26***	0.75*	(0.62–0.90)
Rewards for prosocial involvement	−0.02	0.99	(0.80–1.23)	−0.02	0.91	(0.80–1.04)	0.92	(0.74–1.15)	−0.14*	0.77	(0.60–1.00)
Days physically active	0.20***	1.14	(1.04–1.25)	0.08*	1.04^{M}	(0.98–1.10)	0.91	(0.83–1.00)	−0.12	0.91	(0.81–1.03)

***$p < .001$

**$p < .01$

*$p < .05$

[M] Significantly larger effect size among males

Note: pos. disc. = positive discipline. Correlation and multinomial logistic regression results for risky sex include 10th and 12th graders; correlation and logistic regression results for pregnancy/STI include 12th graders only. Adjusted odds ratios control for gender, age, race, language spoken at home, parental education, foster care or juvenile justice placement, and living in a two-parent home. Regression p values reflect Benjamini-Hochberg adjustments for multiple testing

2009). This study contributes to this literature by demonstrating that some risk and protective factors previously found to predict various problem behaviors are also associated with risky sexual behavior and many with pregnancy or STI. The findings of this study also support the ability of prevention programs to target these factors to potentially affect a more diverse set of youth problem behaviors than may have been previously considered. Addressing multiple outcomes with shared predictors will lead to more cost-efficient and effective forms of prevention programming (Botvin and Griffin 2014).

This study also finds that the factors associated with risky sexual behavior and its consequences (pregnancy, STI) are

indeed diverse, adding to the literature regarding known factors associated with these outcomes. These findings can contribute to the development of etiological models of risky sexual behavior, as well as support more effective prevention programming. Those programs that have addressed the prevention of risky sexual behavior among adolescents have commonly focused on only individual-level factors and methods; however, an ecological approach—one that identifies antecedents of risky sex across multiple domains—could provide a broader and possibly more effective means to predict and reduce these behaviors (DiClemente et al. 2007).

Limitations

Due to the cross-sectional nature of the data, the current study does not intend to investigate causal associations; rather, this study provides evidence for concurrent relationships between problematic sexual behaviors and well-documented risk and protective factors for concomitant problem behaviors. Given the strength and significance of these findings, the current study does provide a basis for future examination of the predictive validity of these risk and protective factors for risky sexual behaviors using longitudinal data and theoretical testing to further understand the unique mechanisms of the relationship between predictors and outcomes. In addition, while these analyses include multiple covariates, including parental education, some specifically relevant control variables were not available. For example, more specific measures of familial socioeconomic status, childhood trauma, or early initiation of sexual behavior may be helpful in further specifying the strength of the relationships observed in this study.

This study found more consistent relationships between risk and protective factors and risky sexual behavior than with its associated consequences. Pregnancy and STI are low base-rate outcomes, making significant relationships more difficult to detect. In addition, it is possible that pregnancy and STI were underreported by respondents, which may have further reduced the strength and significance of the observed relationships. Youth are often inconsistent reporters of their STI status, leading to likely underestimation (Dariotis et al. 2009). In addition, the use of a school-based survey may have led to fewer reports of having been pregnant, as youth who are pregnant or have had children are more likely to drop out of school and would thus not have participated in the survey. The pragmatic utility of a school-based survey allows for a broad view of these relationships; however, it would be useful to complement these findings with future studies that seek to include those not attending school as well as expand analyses of how these relationships vary by level of risk.

Conclusion

Given the diverse, severe, and lasting consequences of many adolescent problem behaviors, prevention research and programming should be broad in its scope to include as many problem behaviors as possible. Although this study did not examine intervention effects, its findings that many risk and protective factors for delinquency and substance are also associated with risky sexual behavior is consistent with studies of preventive interventions that have observed crossover effects on non-targeted behavioral outcomes (Bailey 2009; Monahan et al. 2014). Other adolescent problematic outcomes should also be considered for their possible relationships with known risk and protective factors for substance use, delinquency, and violence in order to better understand their etiology and bolster prevention programing for the multifaceted challenges of youth development.

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