

Original Study

Associations Between Depressive Symptoms and Sexual Risk Behavior in a Diverse Sample of Female Adolescents

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Abstract. *Study Objective:* To determine associations between depressive symptoms, locus of control, and sexual outcomes in a predominantly African-American cohort of female adolescents.

Design: A computerized assessment was administered to participants as part of a larger randomized clinical trial. We assessed sexual risk behaviors (SRBs) via self-report, and we assessed depressive symptoms using the Center for Epidemiologic Studies Depression Scale. We used multivariate regression to determine associations between depressive symptoms and outcomes while controlling for covariates.

Setting: This was a secondary analysis of baseline data collected during a randomized clinical trial intended to prevent unintended pregnancy and sexually transmitted infections (STIs).

Participants: 572 adolescent females, ages 13 to 21 years, were recruited via a hospital-based adolescent clinic and community-wide advertisements.

Main Outcome Measures: Participants reported on prior sexual intercourse, number of lifetime partners, frequency of intercourse, history of pregnancies and STIs, and locus of control.

Results: Two thirds of the sample had been sexually active. In a model that controlled for all covariates, those with a high level of depressive symptoms had higher odds of having had intercourse (adjusted OR = 2.29; 95% CI = 1.18–4.43). High levels of depressive symptoms were also independently associated with increased numbers of lifetime sexual partners and an external locus of control. However, when depression and locus of control were included in the same model, locus of control was not independently associated with SRBs.

Conclusion: These findings support other literature demonstrating an association between depression and SRBs, particularly in a largely African-American population. They

further suggest that perceived control does not fully explain the relationship between depression and SRBs.

Key Words. Sexual behavior—Depression—Adolescent—African-American—Locus of control

Introduction

Almost half of U.S. high school students are currently sexually active.¹ Within this population, 37% did not use a condom at last sexual intercourse and 14% report four or more lifetime partners.¹ The result is that 25% of adolescent females currently have sexually transmitted infections (STIs).² Furthermore, about 750,000 15- to 19-year-old females become pregnant in the United States each year,³ and 82% of those pregnancies are unintended.⁴

Studies have demonstrated associations between sexual risk behaviors (SRBs) and depression. Cross-sectional studies have shown depression in adolescents to be associated with having intercourse at an early age,⁵ not using contraception,^{5,6} and history of STIs,⁷ as well as pregnancy and multiple sexual partners.^{5,8} Longitudinal studies have shown that high-risk behavior patterns can predict later depression⁹; in fact, the specific diagnosis of an STI can result in depression.^{10,11} However, other studies have demonstrated a temporal relationship in the reverse direction. Depression in adolescents has been significantly associated with subsequent condom nonuse,^{12–14} birth control nonuse,^{13,14} pregnancy,¹⁴ and having non-monogamous partners.^{13,14}

However, two important gaps in this literature remain. First, relatively few data describe the relationship between depression and SRBs among female African-

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American adolescents. Compared with Caucasians, African-American youth are more likely to report depressive symptoms.^{15,16} Because 50% of female African-Americans between 14 and 19 years of age have an STI,² it is particularly important to clarify whether relationships between depression and SRBs persist in predominantly African-American populations.

Second, the precise mechanism of the relationship between depression and SRBs is not clear. For instance, depression may influence (1) progression from abstinence to intercourse; (2) progression from sexual intercourse to risky sexual intercourse; or (3) both (Figure 1). Additionally, depression has been associated with a more external locus of control in adolescents. Some researchers have found that adolescents are more likely to engage in SRBs if they have a greater belief that others control what happens to them, including whether or not the adolescent has sex or gets pregnant.^{5,17} As with depression, locus of control may operate at different levels along the continuum toward risky sexual intercourse (see Figure 1). Initial reports suggest that there may be a link between depression and locus of control among female African-American adolescents,¹⁴ but it is unclear whether locus of control is also related to sexual activity in this population.

The purpose of our study was to investigate relationships between depression, locus of control, and SRBs in a predominantly African-American sample of female adolescents. We hypothesized that high levels of depressive symptoms would be significantly associated with having had sexual intercourse, other SRBs, and a more external locus of control in this population.

Materials and Methods

Setting

This is a secondary analysis of baseline data collected during a randomized controlled trial (R01-HD41058).

Although the primary aim of the study was to compare motivational interviewing with standard advice and information about abstinence, contraception, and STI prevention, an important secondary aim was to examine interrelationships between sexual behavior and mental health in this cohort.

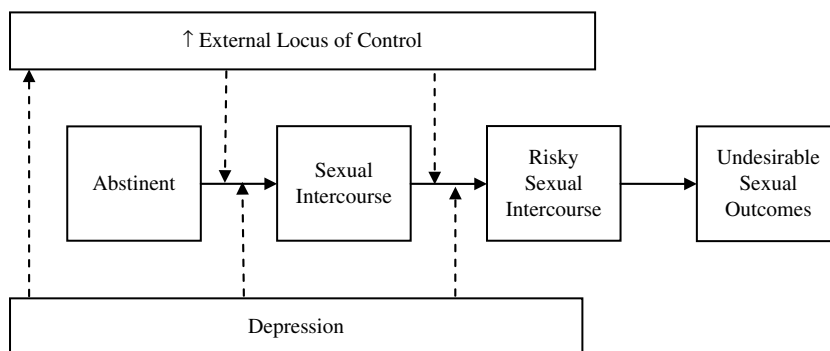
Participants and Procedure

In 2003–2006, we recruited 572 adolescent females, ages 13 to 21 years. We recruited from a hospital-based adolescent clinic and through advertisements posted at college campuses, hospitals, community centers, and businesses. At baseline, we administered a 60- to 90-minute computerized assessment to all participants. The study protocol, which included a waiver of parental consent, was reviewed and approved by the Human Rights Committee (the institutional review board [IRB]) of the Children's Hospital of Pittsburgh and the University of Pittsburgh (IRB #0405473).

Measures

Dependent Variables: Sexual Risk Behaviors and Locus of Control.

To measure sexual intercourse accurately in our sample, we provided the following clarification to the participants: "The word 'sex' means voluntary sexual intercourse. By voluntary, we mean sexual intercourse that you WANTED to have, not that was forced or against your will. By sexual intercourse, we mean when a guy puts his penis in a girl's vagina." This was followed by the question "Have you ever had sex?" For those who reported prior sexual intercourse, we asked items related to (1) number of partners; (2) frequency of sexual intercourse; (3) history of STIs; and (4) prior pregnancies. To assess lifetime sexual partners, we asked participants, "During your life, how many people have you had sex with?" To assess intercourse frequency, we asked participants to report how many times they had had intercourse over the past



Dashed arrows represent potential influences of depression and/or external locus of control on sexual progression in adolescence. Examples of risky sexual intercourse include multiple partners and high frequency of sex. Examples of undesirable sexual outcomes include sexually transmitted infections and unintended teenage pregnancies.

Fig 1. Interrelationships Among Depression, External Locus of Control, and Sexual Outcomes.

30 days. We also asked respondents to report whether they had ever been diagnosed with an STI and whether they had ever been pregnant.

We measured locus of control by asking participants to rate eight statements on a four-point Likert scale (scale range: 8 to 32) according to how strongly they agreed or disagreed with each statement. These items represented accepted constructs of Wallston's original Multidimensional Health Locus of Control scale,¹⁸ including chance/luck external control (e.g., "Luck is what determines whether or not I get pregnant" and "I am likely to get pregnant no matter what I do"), and powerful-others external control (e.g., "My boyfriend decides whether or not I have sex" and "Other people, like family, friends, doctors or nurses, help me stay abstinent"). A higher score indicates an external locus of control, the belief that other people or chance control events that affect the participant, rather than the belief that she controls events that affect her.

Independent Variable: Depressive Symptoms. We used the Center for Epidemiologic Studies Depression (CES-D) Scale to measure depressive symptoms. This scale has been validated for use in adolescents.^{19–21} It has also been used successfully in samples of minority youth.^{11,22} The CES-D asks participants to rate over the past week how often they felt each of 20 feelings on a four-point Likert scale, ranging from none of the time (0) to all the time (3); score range, 0 to 60. Based on standards used in the literature, a high level of depressive symptoms was defined as a CES-D score of 24 or above.^{9,16,21}

Covariates

The computerized assessment collected information on demographics, including age, race, maternal level of education, receipt of medical assistance, and living arrangement.

Analysis

We first computed characteristics of the sample (race, maternal level of education, status of medical assistance, living arrangement, and depressive symptoms) by history of prior sexual activity. We then conducted bivariate and multivariate analyses to assess independent associations between depression and outcomes while controlling for covariates. For dichotomous outcomes (intercourse, STIs, and prior pregnancies), we used logistic regression. For continuous outcomes (lifetime sexual partners, frequency of intercourse, and locus of control) we used linear regression. For linear regression analyses, we tested the assumptions of linear regression and transformed the outcome variable when necessary to normalize the residuals.

We then conducted additional analyses for any SRB outcomes that were independently associated

with depressive symptoms, including locus of control in these models as a second independent variable. The purpose of these additional analyses was to determine whether locus of control was a mediator in the relationship between depressive symptoms and SRBs.

We conducted two sensitivity analyses to determine the robustness of our results. First, we conducted all analyses using stepwise backward regression instead of controlling for all covariates. We also conducted all analyses using depression as a continuous variable. We did not include participants with missing data in the analysis. For all analyses, we considered significance as a two-tailed $P < .05$. We used Stata Statistical Software for all analyses.²³

Results

The mean age of the 572 participants was 17.4 (SD = 2.2). Two thirds of the participants were non-white (59% of the sample were African-American, and 9% were biracial, Hispanic, Asian, or Native American). Nearly one third of the sample received medical assistance, and one third lived without a parent or guardian. Based on a CES-D cutoff of 24 or higher, 13.7% of participants had a high level of depressive symptoms.

Of the 572 participants, 388 (67.8%) had been sexually active (Table 1). One fourth reported having had an STI, and 17% reported having been pregnant. The mean age at first intercourse was 15 years (SD = 1.8), and the mean locus-of-control score was 12.9 (SD = 3.5; see Table 1).

In a model that controlled for covariates, those with high levels of depressive symptoms based on the CES-D score had higher odds of having had intercourse (OR = 2.29; 95% CI = 1.18–4.43). Other factors associated with having had sexual intercourse were older age, African-American race, and receipt of medical assistance (Table 2).

In multivariate analyses of those who had been sexually active, depressive symptoms were independently associated with an increased number of lifetime sexual partners ($\beta = 0.30$, $P = .002$) but not with frequency of sexual intercourse ($\beta = 0.06$, $P = .72$). Multivariate analyses of those who had been sexually active also showed that depressive symptoms were not associated with a history of STIs or pregnancies (see Table 2).

Among all participants, when controlling for covariates, high depressive symptoms were significantly associated with external locus of control ($\beta = -0.013$, $P = .003$). Among the covariates, only age was similarly associated with external locus of control ($\beta = 0.0017$, $P = 0.041$).

We conducted two additional analyses because two outcomes were independently associated with depressive symptoms. In these multivariate analyses that also

Table 1. Sample Characteristics by Sexual Activity^a

Characteristic	Total Sample (N = 572) N (%)	Ever Had Sex (N = 388) %	P ^b
Age, Mean (SD)	17.4 (2.2)	17.9 (2.0)	<.001
Race			
White	184 (32.2)	66.3	.60
Non-White	387 (67.8)	68.5	
Maternal Education ^c			
Low	107 (18.7)	69.2	.82
Medium	149 (26.1)	69.1	
High	315 (55.2)	66.7	
On Medical Assistance			
No	394 (69.0)	64.7	.02
Yes	177 (31.0)	74.6	
Living Arrangement			
With Parent or Guardian	381 (66.7)	63.5	.002
Without Parent or Guardian	190 (33.3)	76.3	
Depressed (CESD ^d ≥ 24)			
No	492 (86.3)	65.7	.008
Yes	78 (13.7)	80.8	
CESD Score, Mean (SD)	13.9 (9.4)	15.0 (10.1)	<.001
Ever Had an STI		25	
Ever Been Pregnant		17	
Age at Coitarche, Mean (SD)		15.0 (1.8)	
Locus of Control, Mean (SD)		12.9 (3.5)	

^aPercentages do not always add to 100 due to rounding.

^bP-values represent significance levels comparing those who ever had sex with those who never had sex.

^cLow = mother did not graduate high school; Medium = mother graduated high school but not college; High = mother graduated college.

^dCenters for Epidemiologic Studies Depression (CES-D) Scale.

included locus of control as an independent variable, depressive symptoms remained significantly associated with having had sexual intercourse (OR = 2.13; 95% CI = 1.09–4.15) and with an increased number of lifetime sexual partners ($\beta = 0.3058$, $P = 0.001$). However, external locus of control was not significantly associated with having had sexual intercourse (OR = 1.04; 95% CI = 0.98–1.10) or with an increased number of lifetime sexual partners ($\beta = -0.0068$, $P = 0.50$; Table 3).

Results were similar when we conducted all analyses using stepwise backward regression instead of including all covariates. Additionally, all results were similar when we conducted analyses using depressive symptoms as a continuous, rather than a categorical, variable.

Discussion

In a predominantly African-American sample of female adolescents, we found several important associations. First, those with high levels of depressive

symptoms had higher odds of having had sexual intercourse, even when we controlled for covariates. In the subpopulation of female adolescents who had ever had sex, high levels of depressive symptoms were independently associated with increased number of lifetime sexual partners but not with a history of STIs or pregnancy. High levels of depressive symptoms were significantly associated with an external locus of control. In a model that controlled for locus of control as well as demographic factors, depressive symptoms remained significantly associated with ever having had sex and with an increased number of lifetime partners, and locus of control was not significantly associated with either outcome.

Other studies have also found a link between depression and sexual activity^{8,24,25} as well as associations between depression and greater number of sexual partners.^{8,13,26} It is unclear from our findings where the direction of causality lies, due to the cross-sectional nature of the data. However, most studies have suggested that depression predicts SRBs,^{12–14} as postulated in Figure 1. Our finding of a significant association between depressive symptoms and sexual activity may provide additional support for the theory that depression influences the progression from abstinence to sexual activity. Furthermore, the finding of an association between depressive symptoms and multiple lifetime partners may support the hypothesis that depression influences the progression from sexual activity to risky sexual behavior.

We found no association between depressive symptoms and history of STIs or pregnancy, which is inconsistent with other findings in the literature. For instance, Mazzaferro and colleagues found that depression was associated with past STIs in 14- to 25-year-old women,⁷ and analyses of the National Longitudinal Study of Adolescent Health data revealed an association between depressive symptoms and history of STIs at baseline,²⁷ as well as evidence that depressive symptoms at baseline predicted increased risk for an STI diagnosis within 1 year.¹⁰ We found statistically significant associations between depressive symptoms and sexual intercourse as well as between depressive symptoms and number of lifetime partners; thus, it would seem logical that the sequelae of these behaviors, such as pregnancy and STIs, would have significant associations as well. The failure to attain significance in these variables may have been the result of insufficient power to detect these differences.

Few other studies have examined associations between depressive symptoms and locus of control. DiClemente and colleagues found that psychological distress in sexually active African-American female adolescents at baseline was predictive of perceiving less control in their relationship 6 months later.¹⁴

Table 2. Multivariate Analyses

	Ever Had Intercourse (N = 572)	LifetimeSexual Partners ^a (N = 388 ^b)		Frequency of Sexual Intercourse ^c (N = 388 ^b)		Ever Had an STI (N = 388 ^b)	Ever Been Pregnant (N = 388 ^b)	External Locus of Control ^d (N = 572)	
	Adjusted OR ^e (95% CI)	Beta (SE)	P	Beta (SE)	P	Adjusted OR ^e (95% CI)	Adjusted OR ^e (95% CI)	Beta (SE)	P
Has depressive symptoms	2.29 (1.18–4.43)	0.30 (0.09)	.002	0.06 (0.18)	.72	1.51 (0.79–2.88)	0.95 (0.45–1.97)	–0.013 (0.0044)	.003
Age	1.78 (1.57–2.03)	0.08 (0.02)	<.001	0.08 (0.04)	.049	1.34 (1.14–1.56)	1.27 (1.07–1.51)	0.0017 (0.00082)	.041
Race									
White	Reference	Reference		Reference		Reference	Reference	Reference	
Black	2.64 (1.60–4.36)	0.12 (0.08)	.14	–0.26 (0.16)	.11	4.69 (2.31–9.50)	3.81 (1.74–8.34)	0.0040 (0.0036)	.26
Maternal level of education ^f									
Low	Reference	Reference		Reference		Reference	Reference	Reference	
Medium	1.02 (0.56–1.85)	–0.02 (0.11)	.84	–0.18 (0.21)	.40	0.63 (0.30–1.32)	1.61 (0.71–3.63)	0.0020 (0.0045)	.66
High	0.76 (0.44–1.33)	–0.07 (0.10)	.46	–0.25 (0.19)	.20	1.00 (0.52–1.93)	1.32 (0.61–2.85)	–0.0058 (0.0042)	.17
Receives medical assistance	1.36 (0.86–2.16)	0.18 (0.08)	.02	0.04 (0.16)	.79	2.41 (1.40–4.15)	2.04 (1.12–3.72)	–0.0028 (0.0035)	.42
Lives with parent	1.30 (0.79–2.13)	–0.16 (0.08)	.057	–0.11 (0.16)	.51	1.19 (0.65–2.17)	1.14 (0.58–2.22)	–0.0062 (0.0036)	.09

^aTransformed using the natural log transformation in order to normalize the residuals.

^bThese Analyses were conducted only on data from sexually active participants.

^cTransformed using the square root transformation in order to normalize the residuals.

^dTransformed using the inverse square root transformation in order to normalize the residuals.

^ePrimary models controlled for all covariates.

^fMaternal education: Low = mother did not graduate from high school; Medium = mother graduated from high school but not college; High = mother graduated from college.

Table 3. Multivariate Analyses Testing Mediation of Locus of Control

	Ever Had Intercourse (N = 572)	Lifetime Sexual Partners ^a (N = 388 ^b)	
	Adjusted OR (95% CI) ^c	Beta (SE)	P
Has depressive symptoms	2.13 (1.09–4.15)	0.31 (0.095)	.001
Locus of control	1.04 (0.98–1.10)	–0.0068 (0.010)	.50
Age	1.81 (1.58–2.06)	0.077 (0.022)	.001
Race			
White	Reference	Reference	
Black	2.67 (1.61–4.41)	0.12 (0.084)	.15
Maternal level of education ^d			
Low	Reference	Reference	
Medium	1.03 (0.56–1.87)	–0.022 (0.11)	.83
High	0.75 (0.43–1.31)	–0.073 (0.099)	.46
Receives medical assistance	1.35 (0.85–2.14)	0.18 (0.079)	.02
Lives with parent	1.28 (0.78–2.10)	–0.16 (0.083)	.06

^aTransformed using the natural log transformation in order to normalize the residuals.

^bThese Analyses were conducted only on data from sexually active participants.

^cAdjusted for all variables in the table.

^dMaternal education: Low=mother did not graduate from high school; Medium = mother graduated from high school but not college; High = mother graduated from college.

Our findings are consistent with this, though it is uncertain, in our population, whether the depressive symptoms and decreased perceived control occurred concurrently or whether one preceded the other.

Additional studies have examined the link between sexual risk-taking behavior and perceived control and have found an association between increased SRBs and decreased perceived control.^{5,17} However, we did not find an independent relationship between SRBs and external locus of control in this study. Thus it remains unclear whether locus of control mediates the relationship between depressive symptoms and SRBs. This suggests that relationships among depressive symptoms, locus of control, and SRBs should be further explored. It may also be valuable to explore other potential mediators of these relationships, including self-esteem or self-efficacy.

These findings may be valuable for clinicians who work with adolescent populations. For example, those who care for adolescents in a primary care or gynecological setting should consider that patients engaging in SRBs may also be suffering from depression. Providers may wish to screen female adolescents presenting with sequelae of SRBs (including STIs and unintended pregnancies) for depressive symptoms. Similarly, providers who care for depressed youth must be aware of the greater odds that these adolescents may be engaging in SRBs. They therefore may wish to screen and counsel regarding these behaviors in order to protect depressed youth from additional negative outcomes.

The major limitation of this study was that these data were cross-sectional, so we cannot infer causality. In addition, because the study population was composed of female adolescents in the greater Pittsburgh area, these findings cannot be generalized to adolescents in

other regions. Finally, because of the sample size, there may have been insufficient power to generate certain significant results. Specifically, there may have been insufficient power to detect a significant association between depressive symptoms and history of pregnancy and STIs.

Despite the limitations, this study is unique in that it examined these associations in a predominantly African-American female adolescent sample and incorporated locus of control into the theoretical model. Additionally, although recruitment for this study began with a clinic population, the community-wide recruitment eventually served to create a sample composed mainly of female adolescents that represented the greater community in a large urban area. Therefore, though not a national sample, these findings are nevertheless important and relevant in the greater context of addressing the high rates of STIs and unintended pregnancies in U.S. adolescents. Our results support other findings that link depression and SRBs, and we explored one possible mechanism for this link. Future studies may focus on improving our understanding of the mechanisms by which depression affects SRBs, including locus of control and other possible mediators, such as self-esteem and self efficacy. Understanding such mechanisms will help us tailor mental health counseling and education toward reducing SRBs among adolescents. Mechanistic understanding of these relationships will similarly allow us to design more powerful future interventions to reduce SRBs by incorporating a depression-screening and -treatment component.

Acknowledgments: Dr. Gold and the study from which these data were compiled were supported by a grant from the National Institute of Child Health and Human Development (R01-

HD41058). Ms. Rubin is supported by funding from Dean Arthur S. Levine, MD, and the Clinical Scientist Training Program at the University of Pittsburgh School of Medicine, and from the Doris Duke Charitable Foundation. Dr. Primack is supported by a Physician Faculty Scholar Award from the Robert Wood Johnson Foundation, a career development award from the National Cancer Institute (K07-CA114315), and a grant from the Maurice Falk Foundation. The authors also thank the North American Society for Pediatric and Adolescent Gynecology for awarding this study the Sally E. Perlman Best Poster Award at the 21st Annual Meeting in April 2007.

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