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Original article

Depressive Symptoms and Sexual Risk Behavior in Young, Chlamydia-Infected, Heterosexual Dyads

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Abstract

Purpose: To examine associations between depressive symptoms and dyad-level sexual risk behavior in young heterosexual dyads with sexually transmitted infection (STI).

Methods: Chlamydia-positive 14–24-year-old, heterosexually active outpatients and their opposite-sex partners completed an assessment that included demographics, past and recent STI risk behaviors, and the Beck Depression Inventory (BDI). Participants in the top 25% of BDI scores within gender were categorized as depressed. Variables were created to identify dyads in which the female or male partner was depressed, as well as a measure of concordance of depression between partners. Dyad-level STI risk variables were created from the STI risk characteristics reported by each dyad member, and associations between these and the depression variables were analyzed.

Results: The 130 dyads were comprised of young men and women at high STI risk. One-third of dyads had at least one depressed partner. Dyads in which the female partner was depressed had greater partner age difference, greater total number of lifetime partners, and one or more partners reporting substance use within 2 hours before sex, compared with dyads in which the female partner was not depressed. Dyads in which the male partner was depressed were more likely than the nondepressed-male dyads to report substance use before sex. All dyads in which both partners were depressed reported substance use before sex.

Conclusions: In young, chlamydia-infected, heterosexual dyads, depressive symptoms, especially in women, is related to increased dyad-level STI risk, including greater partner age difference, more partners, and substance use before sex.

Keywords: Depressive symptoms; Unsafe sex; Sexual partners; Dyad

An increasing body of research has explored the associations of depressive symptoms, sexual risk behavior, and sexually transmitted infection (STI) in both adolescents and adults [1–4]. Sexually active adolescents and young adults with depressive symptoms report increased sexual risk, including having multiple partners, using condoms inconsistently, having an injection drug–using partner, and having a partner with an STI [2] Although few studies have specifically examined depressive disorders, analyses of a New

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Zealand birth cohort found that 21-year-olds with depressive disorders had a risk ratio of a lifetime history of STI of 1.6 [3]. Longitudinal studies have shown that antecedent depressive symptoms are associated with subsequent sexual risk behavior [5–8] and STIs [9].

Female adolescents are approximately twice as likely as male adolescents to report depressive symptoms [10], mirroring the increased rates of depression seen in adult women compared with men [11]. Compared with their female counterparts, male adolescents who are depressed may be more likely either to ''act out'' or to distract themselves from their depressive symptoms by engaging in more or higher-risk behaviors that lead to STI [11]. In a national sample of adolescents, boys with high depressive symptom levels at baseline reported increased STI risk behaviors 1 year later, including condom nonuse at last sex and substance use at last sex; associations between depressive symptoms and subsequent sexual risk behaviors were less strong and less consistent for girls [7]. However, adolescent and young adult women who are depressed may be at increased risk for STIs for other reasons, such as difficultly being able to assert themselves in sexual relationships, to effectively negotiate condom use, and to say ''no'' to sex. In a 6-month prospective study of sexually active female adolescents, compared with those who were not distressed, adolescent girls with depressive symptoms indicative of emotional distress subsequently reported more psychological barriers to condom use and indicators of unhealthy relationships, as well as sexual risk behaviors [8]. Individuals who are depressed may be predisposed to have partners who are also depressed [12], compounding their risk of STI.

Despite this evidence, there is a paucity of research that has examined how the presence of depressive symptoms plays out within two-person sexual partnerships (dyads) in which STI risk is realized. Similarities and differences in individual characteristics may distinguish dyads and be predictive of increased sexual risk. For example, dyads concordant for high levels of cigarette smoking, alcohol use, and marijuana use reported lower rates of condom use, used less reliable forms of contraception, and drugs/alcohol use prior to sex when compared with dyads concordant for low involvement in health-risk behaviors [13]. Discordant dyads (composed of a high-risk and a low-risk partner) showed intermediate levels of condom and contraceptive use.

As part of a multisite study of heterosexual chlamydial transmission, psychological and behavioral data were collected from adolescent and young adults infected with *Chlamydia trachomatis* (CT) and from their opposite sex sexual partners. The main objective of these analyses was to examine associations of concordance of depressive symptoms between dyad partners with dyad-level STI risk behaviors. In addition, these analyses sought to explore the role of gender in the observed associations, that is, to determine whether dyad STI risk differed depending on whether the male partner, the female partner, or both were depressed.

Methods

Participants and procedures

Data for this project come from the Transmission of Incident and Prevalent Chlamydial Infection (TIPCI) study, a multicenter study designed to examine biologic and behavioral factors influencing the transmission of CT. Between April 2000 and September 2003, heterosexually active male and female patients 14–24 years of age who were attending an STI clinic in the Midwest, an adolescent clinic and emergency department at a children's hospital in the Northeast, and an STI clinic, emergency department, and adolescent clinic at a general hospital in the Northeast were recruited and tested for CT infection. To participate, patients needed to be willing to be contacted by telephone or pager and to name at least one sexual partner for the purposes of the study. Individuals who had been on antibiotics in the previous 30 days, had known HIV infection or another immunosuppressive condition, could not communicate in English, or were in emotional crisis were excluded from the study. Any male or female participant found to have CT infection was treated and their opposite-gender sexual partners 14 years or older was sought. Once located, consenting partners had a full diagnostic work up and laboratory evaluation for CT and other STIs. In addition to the STI evaluation, index and partner participants each completed a questionnaire that included demographic information, STI risk behaviors, and the Beck Depression Inventory (BDI) [14]. A research assistant then conducted a face-to-face interview using calendar recall to assess coital event–specific STI risk behaviors in the past 30 days. The institutional review boards at Indiana University Purdue University Indianapolis, Boston Medical Center, Children's Hospital Boston, and the Centers for Disease Control and Prevention approved the study.

The analytic sample included 129 adolescent/young adult heterosexual dyads; nine individuals (six women and three men) contributed to two dyads each. Consistent with the population receiving clinical services at the recruitment sites, the majority of the 249 individuals in the sample self-identified as black or African-American race/ethnicity (71%), with other racial groups represented in much smaller proportions (white, 16%; Asian or Asian American, 1%; Native American, 1%; and other, 11%); 9% of the sample reported Hispanic ethnicity. Partners in most dyads reported the same race (76%) and ethnicity (88%).

By definition, all dyads (100%) had at least one partner with positive test results for CT; in 69 dyads (53%), both partners had positive CT test results (not genotype specific). One or both partners in 16 dyads (12%) also had gonorrhea and in 31 dyads (24%) also had infection with *Trichomonas vaginalis*.

Measures

Age. Each dyad member reported her or his age in years on the baseline questionnaire.

Depressive symptoms. Each participant completed the BDI on the baseline questionnaire. The BDI is one of the self-report methods most frequently used to assess severity of depression in adults and adolescents 13 years and older [14]. Although BDI cut-offs have been used to identify depressive disorders, research has suggested that subthreshold depressive symptoms are also associated with substantial psychosocial impairment [15]. Therefore, the distribution of BDI scores was examined separately for males and females and the top quartile within each gender categorized as ''depressed'' [16]. Variables were then created to represent dyads in which the female partner was depressed (D_F) and those in which the male partner was depressed (D_M). In addition, a dyad depressive symptoms typology was created to describe concordance and discordance of top-quartile depressive symptom scores within dyads and to specify the gender of the depressed partner(s). The following four groups were identified: 1) Depressed Female–Depressed Male (D_F–D_M); 2) Depressed Female–Nondepressed Male (D_F–ND_M); 3) Nondepressed Female–Depressed Male (ND_F–D_M); and 4) Nondepressed Female–Nondepressed Male (ND_F–ND_M).

Dyad-level STI risk. We created variables assessing dyad-level STI risk from the age and STI risk behaviors reported by the individual members of the dyads. We calculated the absolute value of the difference in age in years between the dyad partners from the individual partners' ages and analyzed this difference in age as a continuous variable. In addition, consistent with age difference categories reported in previous research [17,18], we categorized this variable into partner age difference of 3 years or less versus more than 3 years. From the number of lifetime sexual partners (collected on the baseline questionnaire) and number of partners in the past 30 days (derived from the calendar interview) reported by each dyad member, we created variables for the total number of lifetime and 30-day partners for the dyad. We identified dyad-level condom nonuse in past 30 days if no condom-protected coital events were reported by either partner. Based on individual dyad members' reports of alcohol, marijuana, or other substance use within 2 hours before sexual intercourse in the past 30 days, we created a variable for substance use before sex by either partner. Some participants reported more sexual partners in the past 30 days than the one or two partners who were also enrolled in the study. Data from all of each participant's reports of condom nonuse and substance use contributed to the dyad-level variables, whether or not the behaviors were specific to sex events with the partner in the dyad.

Data analyses

Because the distributions of the STI risk variables were skewed, we evaluated the difference in STI risk between depressed and nondepressed individuals within each gender using the Mann-Whitney *U* test or Chi-square test, as appropriate. We then examined the importance of gender of depressed dyad members by comparing dyad STI risk between dyads with and without the male (female) member being depressed using the Mann-Whitney *U* test or Chi-square test. To determine whether the dyad risk characteristics were significantly different across the dyad depressive symptoms categories, we used repeated-measures nonparametric analysis of variance, which accounted for clustering by participant and partner, and Tukey HSD method for *post hoc* pairwise comparisons. We considered results significant for p values $\leq .05$; however because these analyses are exploratory, we also note findings for p values from $>.05$ to .10.

Results

Individual characteristics

The dyad members were young (98% of the women and 90% of the men were between the ages of 14 and 24 years) and at substantial STI risk (Table 1). Participants reported multiple lifetime sexual partners, with 28% of female and 35% of male dyad members reporting more than one partner in the past 30 days. Most coital events were not protected by a condom. One-half of women and nearly two-thirds of men had used alcohol or other drugs within 2 hours before sexual intercourse at least once in the past 30 days.

Valid depression scores were available for 122 women and 119 men. BDI scores were generally low (median 7 for women and 5 for men); the top quartile scores were 13 for women and 11 for men, corresponding with at least mild severity of depression [19]. Characteristics of male and female dyad partners are shown in Table 1 by depressive symptoms status. Compared with nondepressed women, depressed women reported more lifetime sexual partners ($p = .018$) and in the past 30 days ($p = .057$). There were no differences between depressed and nondepressed men by age or STI risk variables.

Dyad characteristics

More than one-fourth of dyads reported an age difference greater than 3 years (Table 2). The male partner was older in 68% of dyads, the female partner was older in 21%, and the partners were the same age in 11%. Median number of lifetime partners for the dyad was high and less than one-half of dyads reported only two partners (each other). More than one-fourth of dyads reported no condom use in the past 30 days; in only three dyads (2%) did both partners report condom use with every coital event in the past 30 days. In more than three-fourths of dyads, one or both partners reported using alcohol or other drugs within 2 hours of sexual intercourse at least once in the past 30 days.

Of the 121 dyads in which both partners had a valid depression score, 34% contained at least one member who was depressed; in 20 dyads (17%), both partners were depressed.

Table 1
Sexually transmitted infection (STI) risk characteristics of male and female members of heterosexual dyads, by depressive symptoms status [a]

	Women			Men		
Individual Characteristic	Total (n = 124)	Depressed (n = 30)	Nondepressed (n = 92)	Total (n = 127)	Depressed (n = 31)	Nondepressed (n = 88)
Age (years)	19 (14–40)	19 (14–40)	19 (14–26)	21 (15–37)	21 (16–34)	20 (15–37)
Number of sexual partners in lifetime	7 (1–50)	10 (2–30)	5 (1–50) [b]	11 (1–250) [c]	10 (1–250)	14.5 (1–150)
In past 30 days						
Number of partners	1 (1–4)	1 (1–4)	1 (1–4) [d]	1 (1–5)	1 (1–3)	1 (1–5)
Number of coital events	9 (1–168)	14 (1–144)	8 (1–168)[e]	8 (1–166)	8 (1–124)	9.5 (1–155)
Number of unprotected coital events	7 (0–168)	11.5 (1–144)	6 (0–168) [e]	7 (0–166)	7 (0–119)	7.5 (0–147)
No condom use	58 (47%)	18 (60%)	39 (42%)	52 (41%)	12 (39%)	38 (43%)
Any alcohol or other drug use within 2 hours before sex	62 (50%)	16 (53%)	45 (49%)	83 (65%)	23 (74%)	53 (60%)

Data are presented as median (range) or n (%), as appropriate. STI risk characteristics were compared between depressed and nondepressed individuals within each gender using the Mann Whitney *U* test or Chi-square test, as appropriate.

[a] "Depressed" was defined as Beck Depression Inventory (BDI) score in the top quartile for gender (13+ for women, 11+ for men). Valid BDI scores were available for 122 of 146 women and 119 of 127 men.

[b] $p \leq .05$.

[c] Number of sexual partners in lifetime missing for one woman (nondepressed) and three men (two nondepressed, one depressed).

[d] $p \leq .10$.

[e] Excluded one female who reported 513 coital events (511 unprotected events) in the past 30 days.

Associations between depressive symptoms and dyad STI risk

Age difference between partners. Dyads in which the female partner was depressed (D_F) had a greater difference in age between the partners than dyads with a nondepressed female partner (ND_F) (Table 2). There was no significant difference in the proportion of D_F vs. ND_F dyads in which the male partner was older. A similar ($p = .07$) pattern was observed if the male partner was depressed. The proportion of dyads with age difference greater than 3 years was highest in the two depressive symptoms categories in which the female partner was depressed (D_F–D_M and D_F–ND_M).

Dyad total number of lifetime sexual partners. If the woman in the dyad was depressed, the dyad had a higher total number of lifetime sexual partners than if the woman was not depressed ($p = .06$) (Table 2). To determine whether the higher dyad number of lifetime partners was solely a function of depressed women reporting a higher number of partners than nondepressed women, as shown in Table 1, or also a function of their partner's number of partners and

Table 2
Sexually transmitted infection (STI) risk in heterosexual dyads, by depressive symptoms within gender and dyad depressive symptoms category [a]

		Depressive symptoms within gender				Dyad depressive symptoms category			
Dyad characteristic	Total (n = 129)	D_F (n = 32)	ND_F (n = 96)	D_M (n = 31)	ND_M (n = 91)	D_F-D_M (n = 20)	D_F-ND_M (n = 10)	ND_F-D_M (n = 11)	ND_F-ND_M (n = 80)
Age difference (years)	2 (0–22)	3 (0–22)	2 (0–18)[b]	3 (0–22)	2 (0–18)[c]	3 (0–22)	2.5 (1.8)	2 (1–6)	2 (0–18)[c]
Age difference >3 years	35 (27%)	15 (47%)	19 (20%)[b]	12 (39%)	21 (23%)[c]	9 (45%)	4 (40%)	3 (27%)	16 (20%)
Number partners lifetime	21 (4–257)	27 (9–257)	20 (4–165)[c]	20.5 (4–257)	23 (5–165)	25 (9–257)	31 (11–60)	12 (4–47)	20 (5–165)
In past 30 days									
Number partners	3 (2–8)	3 (2–8)	3 (2–8)	2 (2–7)	3 (2–8)	2 (2–6)	4 (2–8)	3 (2–7)	3 (1–7)[b]
No condom use	36 (28%)	9 (28%)	26 (27%)	7 (23%)	27 (30%)	6 (30%)	2 (20%)	1 (9%)	24 (30%)
Any alcohol or other drug use within 2 hours before sex 100 (78%)	100 (78%)	28 (88%)	71 (74%)[c]	29 (94%)	65 (71%)[d]	20 (100%)	6 (60%)	9 (82%)	58 (73%)[d]

Data are presented as median (range) or n (%), as appropriate. Within characteristics, n varied depending on the number of missing responses (<4% missing for each characteristic in a depression category). Dyad STI risk characteristics were compared between dyads with and without the male (female) member being depressed using the Mann-Whitney *U* test or Chi-square test. Dyad risk characteristics were compared across dyad depression categories using repeated-measures nonparametric analysis of variance, with the Tukey HSD method for *post hoc* pairwise comparisons.

D_F = Female partner depressed, ND_F = Female partner not depressed, D_M = Male partner depressed, ND_M = Male partner not depressed.

[a] "Depressed" was defined as Beck Depression Inventory score in the top quartile for gender (13+ for women, 11+ for men).

[b] $p \leq .01$.

[c] $p \leq .10$.

[d] $p \leq .05$.

depressive symptoms status, we examined the number of partners for men and women separately by dyad depressive symptoms category. In D_F–D_M and D_F–ND_M dyads, women contributed a median of 10 and 8 lifetime partners, respectively, but only four partners in ND_F–D_M dyads and five partners in ND_F–ND_M dyads ($p = .009$), underscoring the importance of the depressed woman's contribution to the increased number of partners. Although there was a suggestion that depressed women have sex with men who have had more sexual partners than the male partners of nondepressed women, the association did not approach significance. In D_F–D_M and D_F–ND_M dyads, men contributed a median of 15 and 17.5 lifetime partners, respectively, whereas in ND_F–D_M and ND_F–ND_M dyads, men reported 10 and 12.5 lifetime partners, respectively ($p = .48$).

Dyad total number of partners in the past 30 days. For dyad total number of partners in the past 30 days, there was no difference between D_F and ND_F dyads or between D_M and ND_M dyads (Table 2). However, dyads in which the female partner was depressed and the male partner was not (D_F–ND_M) had a higher number of partners in the past 30 days than each of the other depressive symptoms categories ($p = .003$). Women in D_F–ND_M dyads contributed a median of 2.5 past-30-day partners to the dyad, compared with one each in D_F–D_M, ND_F–D_M, and ND_F–ND_M dyads ($p < .003$ for each pairwise comparison). There was no significant difference in the number of past-30-day partners that men contributed to the dyad according to dyad depressive symptoms category.

Dyad condom nonuse. There were no significant differences in condom nonuse by either partner in the past 30 days by any of the depressive symptoms variables.

Dyad substance use before sex in the past 30 days. Both D_F dyads and D_M dyads reported more drug use within 2 hours before sex in the past 30 days than ND_F and ND_M dyads, respectively (Table 2). Drug use within 2 hours before sex in the past 30 days was reported by 100% of the dyads in which both partners were depressed ($p < .10$ for D_F-D_M vs. ND_F-ND_M comparison). If a woman was depressed, her male partner tended to be more likely to use substances before sex if he was also depressed than if he was not depressed ($p = .06$). However, if a man was depressed, there was no significant difference in whether his female partner used substances on the basis of her depressive symptoms status ($p = .64$).

Discussion

When one or both members of a sexual dyad have depressive symptoms, the couple may be at increased risk for subsequent STI because of increased risk behaviors of the depressed partner(s), the nondepressed partner (if there is one), or both partners. The findings suggest that ways in which depressive symptoms relate to increase sexual risk differ between men and women, and depend on whether one or both partners are depressed. The most risk factors were introduced into the dyads when the female partner was depressed; compared with nondepressed women, women who were depressed had a greater difference in age between themselves and their partner, more sexual partners, and more frequent unprotected sexual intercourse. When the female partner was depressed, the sexual dyad was more likely to have at least one partner using substances within 2 hours of sexual intercourse. Not only were the depressed women more likely to report substance use, but when they partnered with depressed men, these men were also more likely to report substance use. Thus, depressive symptoms in these high-risk women increased their own risk of STI (e.g., by having sex with older men) and their male partner's risk of STI, regardless of his depressive symptoms status (e.g., by bringing to the relationship a history of a high number of sexual partners), as well as the STI risk for the couple (e.g., by having sex with men who, when depressed, were more likely to use substances before sex).

The risks associated with depressive symptoms in women are not inconsequential. Age difference between young sexual partners has been associated with numerous measures of STI risk, including engaging in sexual intercourse [20], having unwanted sex, experiencing intimate partner violence [21]. inconsistent or no condom or contraceptive use [22, 23], unplanned sex while using substances [23], and having multiple partners [23]. In a national sample of U.S. adolescents, a partner age difference of 2 or more years was associated with greater risk of STI (odds ratio 1.63 if the partner was younger and 1.46 if the partner was older), adjusting for other partner and respondent characteristics [24]. One explanation for increased STI risk is the concept of age bridging, or the linking of younger, lower-risk sexual networks with older, higher-risk networks [25]. Difference in age may also represent a power differential between the partners that can interfere with effective negotiation of safer sex practices, including monogamy and consistent condom use. This effect may be exacerbated by depressive symptoms, which can impair self-care, assertiveness, and condom use negotiation skills [8].

We found a strong association between depressive symptoms and using substances within 2 hours before sex, especially for dyads in which both partners were depressed. Several studies have found that the STI risk associated with using substances before sex does not appear to be via condom nonuse with that sexual event, as might be expected [26–28]. Rather, the substance use may confer risk directly by impairing judgment related to selection of new sexual partners [27], an effect that may be compounded by the effect of depressive symptoms on judgment and risk perception. Drugs may also be used to facilitate a sexual encounter [29], which is particularly salient for depressed individuals, who may seek intimacy and self-validation through sex [30] but have difficulty with interpersonal interactions [31, 32]. Alternatively,

or additionally, substance use before sex may be related to dispositional characteristics, such as impulsiveness [33], sensation seeking [34], or a desire for unconventionality [35], that predispose to engaging in both sexual risk behaviors and substance use and can be associated with depression [36,37]. In this cross-sectional study, we were unable to discern the causal nature of the association between increased depressive symptoms and substance use.

The findings support other research that emphasizes the importance of examining depressive symptoms and STI risk in young men and women separately [5,7,38]. For women, depressive symptoms may increase STI risk via mechanisms that relate to choice of sexual partner, such as impaired judgment, inaccurate risk perception, inability to effectively negotiate sex, or overwhelming need for support, security, and/or intimacy afforded by a relationship, resulting in sex with older partners, more partners, and greater frequency. For men, depressive symptoms may confer risk by way of social settings and networks in which substance use may be likely or accepted.

Our research adds to the literature by highlighting the importance of examining associations of depressive symptoms and STI risk at the level of the dyad, with assessments of both partners' characteristics and behaviors. As indicated previously [9], identifying depressive symptoms in a sexually active individual should prompt thorough assessment of STI risk behaviors and eliciting a history of sexual risk behavior should trigger depression screening. This study suggests that knowing about a partner's depressive symptoms provides further information about the risk of STI within the sexual dyad.

Interestingly, we did not find that depressed individuals reported more unprotected sexual events or were less likely to use condoms at all. Condom use was inconsistent in the dyad sample; in 60% of dyads one or both partners reported no condom use and in only 3 dyads did both partners report 100% condom use. It is possible that in a lower-risk sample with more condom use, associations with depressive symptoms would emerge. In addition, the cutoffs on the BDI used in this study were not diagnostic of depressive disorders; associations with STI risk may be different for more severely depressed individuals.

There were several other limitations to this study. The sample included only heterosexual dyads in which at least one partner was infected with CT, limiting the generalizability of the findings; future research should consider the associations within same-sex dyads and in uninfected high-risk samples. Further, it is important to note that we do not infer causality—depressive symptoms could lead to the dyad's STI risk, STI risk could cause depressive symptoms, or a third factor, such as childhood sexual abuse or intimate partner violence, could relate to both depressive symptoms and increased risk. Data on STI risk were self-reported and therefore may have been subjected to social desirability and other reporting biases associated with sensitive behaviors [39]. Self-reported depressive symptoms can also be biased, especially towards under-reporting of symptoms [40]. Furthermore, the presence of high levels of depressive symptoms may have affected some participants' ability to recall behaviors and respond to questionnaire items accurately. Data on relationship characteristics, such as duration and closeness, and prospective, longitudinal research in sexual dyads will be important to understanding the causal nature of the associations. Because all dyads were STI infected, we were unable to use gender and dyad depressive symptoms categories to predict infection. We were also unable to examine our data at the level of the sexual events within the couples, which will be necessary to clarify how substance use before sex relates to the decision to have sex and with whom, and whether to use a condom. Finally, we were unable to measure partner-specific sexual behaviors for those dyads which included a member who reported more than one partner in the past 30 days.

Screening for depressive symptoms among those at risk for STIs and screening for STI risk among those who are depressed remain priorities in health care. As suggested by this research, dyads in which at least one partner, especially the woman, is depressed may be especially likely have a greater age difference between the partners, a higher number of lifetime sexual partners, and more drug use before sexual intercourse, increasing the likelihood of introducing STIs into the dyad. Further research is needed to elucidate the mechanisms of this link between depressive symptoms and STI risk behaviors within heterosexual dyads.

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