The Influence of Depression on Sexual Risk Reduction and STD Infection in a Controlled, Randomized Intervention Trial

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Abstract

Background—A randomized controlled trial of SAFE, a cognitive/behavioral intervention, revealed that it significantly reduces reinfection and behavioral risks among participants compared to controls. However, studies suggest that depression may moderate intervention efficacy among affected persons due to impaired information processing, failure to recognize risk or inability to change behavior.

Goal—We evaluated SAFE efficacy among depressed and nondepressed Mexican- and African-American women after comparing initial risk factors by depression status. We further explored intervention effects in moderately and severely depressed women.

Study Design—We stratified 477 participants (249 intervention, 228 controls) according to their depression status at baseline determined by CES-D scores. Using chi-square and multivariate logistic regression, we evaluated differences in reinfection and behavioral risk at 6-month, 12-month and 1-year cumulative follow-ups between groups within baseline depression strata.

Results—At baseline, 74.4% of women were depressed and had significantly greater levels of behavioral risks than nondepressed women. At follow-up intervals, behavioral risks and reinfection rates were lower among intervention women compared to controls regardless of depression status. For example, at 1-year follow-up reinfection rates were 15.2% in nondepressed intervention women vs. 21.4% in nondepressed controls (AOR=0.6), and 18.6% in depressed intervention women vs. 27.3% in depressed controls (AOR=0.6). Moreover, reinfection was consistently lower among

moderately and severely depressed intervention women than controls (moderately depressed: 19.3% vs. 27.2%, AOR=0.6; severely depressed: 17.9% vs. 27.5%, AOR=0.6).

Conclusions—Despite significantly greater behavioral risk among depressed women at baseline, SAFE was equally successful in reducing reinfection and high-risk behavior among depressed and nondepressed participants.

Keywords

randomized controlled trial; behavioral risk; depression; sexually transmitted infections; risk reduction

Introduction

Compromised mental health is increasingly linked to diminished sexual health.[1,2] Two studies reported that between 39 – 45% of people seeking care at STI or family planning clinics experienced psychological morbidity immediately prior to or at the time of their visit.[3,4] One of these studies estimated that of those identified, approximately 1/3 to 1/2 were experiencing a major depressive disorder,[4] significantly more than general practice patients and the U.S. population as a whole.[5,6] Comorbidity of depression and sexual risk reported in other studies suggest that depressive symptoms are common among high-risk individuals and conversely, high-risk sex is more often practiced by those with compromised mental health.[7–9]

Depression has been linked to low rates of condom use, casual relationships, multiple sex partners, rapid accrual of partners over time, and exchanging sex for money or drugs.[7–13] This association has been found in diverse samples[10,14–18] and settings.[12,13,19–22] It is likely a bidirectional phenomenon: fractious relationships and lack of intimacy are often the reported origin of depressed mood.[23,24] High-risk behavior and depression work synergistically to inhibit coping efforts in terms of risk recognition, stress reduction or significantly, behavior change.[9,14,25]

Health interventions are often grounded in psychological theories that assume subjects can process messages, internalize their personal relevance and act on them.[26,27] Such theories frequently utilize social-cognitive models, which do not account for the moderating influence of affect on learning or behavior.[28] Depression may interfere with information processing, reduce motivation to change behavior, or undermine sustained change.[29–33] Consequently some investigators suggest that depression may negate the benefits of intervention and inhibit efficacy.[34–36] Because depressive symptoms occur so frequently in conjunction with sexually transmitted infection (STI), untreated depression may be a deterrent to intervention-related reduction of high-risk sexual behavior.[37]

In previous publications, we reported reduced rates of gonorrhea or chlamydia reinfection at 1-year follow-up among high-risk Mexican-American and African-American women who participated in a controlled, randomized trial of a behavioral/cognitive intervention, "Project SAFE". Reinfection among intervention participants was 16.8% compared to 26.9% among controls, a difference of 38%.[38] In further analysis of data from that study, we described five dichotomous variables indicating contextual dimensions of sexual behavior significantly associated with reinfection.[39] These include non-mutual monogamy, unsafe sex practices, sex with an untreated partner, acquiring a new partner within 90 days of ending a prior relationship (rapid partner turnover) and douching after sex.[39] We showed that reduced practice of these behaviors explained reduced reinfection among intervention relative to control participants independently of ethnicity, age, and other potential confounders. In this paper we evaluate intervention efficacy in terms of these measures of behavior and reinfection within levels of depressive symptoms, one aspect of participant mental health status.

Our primary goal is to evaluate the impact of depression on SAFE intervention efficacy at 6 month, 12 month, and 0–12 month cumulative follow-up with respect to high-risk behavior and clinically confirmed reinfection. A secondary goal is to confirm the association between depression and sexual risk among women who present for STI care.

Materials and Methods

Procedures

Project SAFE is a behavioral/cognitive intervention to reduce sexual risk behavior and associated chlamydia and gonorrhea reinfection among Mexican- and African-American women. It is theoretically based on an adaptation of the AIDS Risk Reduction Model,[40] and was ethnographically informed and culture- and gender-tailored for this population. Details of intervention design, project recruitment, and research protocols were reported previously.[38] We contacted 947 eligible, English-speaking women aged 14–45 who had a current non-viral STI (chlamydia, gonorrhea, syphilis, or trichomonas), and invited them to join our study. A total of 617 Mexican- and African-American women participated. This report includes 477 participants with complete clinical and interview data at initial and both scheduled follow-up visits; there were no significant differences in depression between this group and those who missed a scheduled follow-up visit.

Initially women were examined by a clinician, screened for infection, treated if necessary and counseled according to CDC protocols. They were interviewed for approximately one-two hours, stratified by ethnicity, and randomly assigned to intervention or control groups. During each scheduled follow-up visit (6 and 12 months after the initial visit), subjects were interviewed again. At these and at problem visits (self-initiated as necessary), clinicians performed physical examinations and screened for and treated infections.

Study Measures

The primary outcome was reinfection with chlamydia and/or gonorrhea determined by GEN-PROBE amplification tests performed on collected specimens. Secondary outcomes are sexual risk behaviors reported by participants during interviews. Interviews were highly detailed and included sociodemographic, behavioral, psychological, and clinical characteristics of study participants. Additionally, we collected extensive information about characteristics of and behavior with up to five sexual partners of each woman. Major constructs are described below.

Demographic and Psychosocial Constructs

1. Unemployed school dropouts: Women who had not completed the 12th grade and were neither employed nor in school;

2. Poverty status: we calculated the total monthly household income based on responses to questions about income from all sources for all household members, the number of people in the household supported by this income and applied federal poverty guidelines to determine <100% poverty level;[41]

3. History of sexual abuse: `ever had a really bad sexual experience like rape or sexual abuse?', or if she reported that sexual debut was forced or occurred prior to 11 years of age;

4. Illicit drug use: women reporting use of any illicit drug (other than marijuana) in the 3 months prior to the baseline interview. (Marijuana use is excluded from this measure: being highly prevalent in our population, it is also relatively unrelated to other forms of illicit drug use and behavioral risk as described in this study).

"Traditional" Measures of Behavioral Risk

In this study we refer to "traditional" behavioral risk factors for reinfection, meaning that they have variously been reported in the literature. We distinguish these from Project SAFE contextually defined risk factors, and give their construction as used in this study here:

1. Casual relationship: currently in a sexual relationship with one or more men (anticipates having sex with him again) with whom she describes her relationship as "off-and-on" or "not steady";

2. No Condoms: reports "hardly ever or never" uses condoms with one or more partners in the past 3 months; and

3. 2+ Sex Partners in the past 3 months

Project SAFE Contextual Measures of Behavioral Risk

We utilized the 5 behavioral measures constructed in previous work to evaluate intervention efficacy. In brief, they are:

1. Non-Mutual monogamy: having a sexual partner who is not steady and faithful, or having more than one partner in the follow-up interval(s);

2. Unsafe sex: either a) never using condoms with one or more casual partners or b) both > 5 unprotected acts in the last 3 months and incorrect or problematic condom use;

3. Unprotected sex with an untreated partner following initial infection;

4. Rapid partner turnover: acquisition of a new sex partner within 3 months of sex with another man;

5. Douching after sexual intercourse.

We evaluated SAFE sexual behavior and reinfection using these measures at each follow-up time point and cumulatively at 1-year. During each period, responses represent the highest-risk behavior with any partner for each measure. Women who did not have a sexual partner were classified in the low risk category for each variable: 40 (8.5%) women in 0–6M, 26 (5.5%) in 6–12M, and 15 (3.1%) in 0–12M.

Depression

Depression was measured using the 20-item Center for Epidemiological Studies Depression Scale (CES-D), an instrument designed to assess depressive symptoms in diverse samples[42] It is a depression screening tool recommended by the U.S. Preventive Services Task Force[43] and has been widely used with diverse populations of varying socioeconomic and demographic characteristics.[44–46] Responses range from 0 (never or rarely) to 3 (most of the time or all of the time). Four items assessing positive symptoms are reverse-coded. Summed-item scale scores range from 0–60 with higher scores representing higher levels of depressive symptoms experienced over the past week. In this study, reliability for the CES-D was $\alpha=.89$. Using established and validated criteria,[44,47] we identified non-depressed (0–15) and depressed subjects (16+). We further divided depressed subjects into moderately depressed (16–27, "MD") and severely depressed (28 +, "SD") subgroups: the SD level has yielded optimal efficiency for detecting depression compared to the Diagnostic Interview Schedule (DSM criteria) in a sample of primary care outpatients,[48] as well as practical applications among adolescents, HIV + patients, and victims of cardiovascular disease.[49–51]

Statistical Analysis

Sociodemographic characteristics of SAFE participants are described by depression level using Pearson's Chi-Square test. The association between depression and sexual risk at intake is

evaluated by modeling each traditional and SAFE-contextual sexual risk behavior using logistic regression with depression as the main predictor variable. We compared depressed to nondepressed participants overall, and MD and SD to nondepressed participants in subanalyses. In each of these we controlled for potential confounders suggested in other studies to be related to depression, high-risk sexual behavior, or both; these include race/ethnicity, age, poverty, sexual abuse, and drug use.[12,46,52–54] In our main analyses we compared study and control group sexual risk behaviors and reinfection status separately within each depression level at 0–6M, 6–12M, and 0–12M follow-up using logistic regression. We controlled for subject age (all other potential confounders were not significant) and baseline behavior when applicable.

Results

Participants

The sample consisted of 149 African-American and 328 Mexican-American women. They were distributed in approximately equal proportions to intervention (n=249) or control (n=228) conditions. Characteristics of participants by depression levels are provided in Table 1. Only one-quarter of women were not depressed based on scoring below the CES-D cutoff of 16 for depressive symptoms. Depressed women were equally divided between MD and SD. Significantly more depressed than nondepressed women dropped out of school while simultaneously unemployed (p=.05) and were more likely to be below the 100% poverty threshold for household income (p<.01) Depressed women were significantly more likely than the nondepressed to report a history of sexual abuse (34.1% vs. 23.0%; p=.02), with SD women reporting the highest rates (41.1%).

Depression and High-Risk Behavior

Analyses of the association between high-risk sexual behaviors within depression levels at initial interview are summarized in Table 2, adjusting for potential confounding by race/ethnicity, age, poverty, history of sexual abuse, and drug use. Results indicate that depressed women are significantly more likely than nondepressed women to practice high-risk sex with the exception of douching after sex. Moreover high-risk behavior occurs with greatest frequency among SD women; for example, they are most likely to be in non-mutually monogamous relationships or to engage in unsafe sex.

Depression and Intervention Efficacy

At 6-month follow-up, Table 3 shows that among depressed women generally, all behavioral risks were significantly lower among study than control women except rapid partner turnover. Among depressed women, MD study women were significantly less likely than controls to engage in non-mutual monogamy (p<.01) or unsafe sex (p=.03). SD study women were significantly less likely than controls to have sex with an untreated partner (p<.05) or douche after sex (p=.04). Study group reinfection was lower than controls regardless of depression, although not significantly so, perhaps due to small cell sizes and thus low statistical power.

At 12-month follow-up (Table 4), all behavioral risks with the exception of non-mutual monogamy were significantly lower among nondepressed study women than their control counterparts. Similarly, depressed study women engaged in non-mutual monogamy, unsafe sex and rapid partner turnover significantly less often than nondepressed controls. They were half as likely as depressed control women to become reinfected (AOR=0.5, p=.03). This was most evident among SD study women, who had significantly lower rates of non-mutual monogamy (p<.01) and rapid partner turnover (p=.01) than controls, translating into significantly lower rates of reinfection (p=.01).

Cumulative 0–12M results are summarized in Table 5. Depressed study women were significantly less likely than controls to practice any of the 5 risk behaviors (non-mutual monogamy, unsafe sex, douching after sex, rapid partner turnover, sex with an untreated partner), and to become reinfected (p=.03). Among moderately depressed women, study women were significantly less likely to be in non-mutually monogamous relationships (p=.03), engage in unsafe sex (p=.05), or douche after sex (p=.01) than their control counterparts. Results were similar among SD women, who were significantly less likely than controls to practice non-mutual monogamy, unsafe sex, or have sex with an untreated partner. Of note, reinfection among study women was very similar across all depression levels (nondepressed: 16.0%; any depressed: 18.4%; MD: 18.3%; SD: 18.5%). These rates were consistently lower than controls, approaching or achieving significance in each instance despite being hampered by low statistical power (small cell sizes), especially among nondepressed women.

Discussion

Intervention Efficacy in a Challenged Population: Depression and Behavior Change

Depression was exceedingly common in our study sample. A majority of participants scored at or above the CES-D cutoff for depressive symptoms. Simultaneously, high-risk sex was associated with depression. Women were challenged not only by poverty and lack of education, but also nonmonogamy, a history of sexual abuse, and unsafe sex. The emotional baggage associated with depression has been linked to feelings of pessimism, difficulty being critical or angry, unassertiveness, and self-denial, all potentially leading to a compromised ability to concentrate and put forth the effort to reduce sexual risk and sustain the safer behaviors.[3,30,55,56] The premise that depression might inhibit efficacy of the SAFE intervention to reduce sexual risk is therefore a reasonable one. However, this premise was not supported by our data. A central finding of this study was that depression did not interfere with intervention efficacy. This process occurred at three levels: timing, maintenance and the number of behaviors changed.

First, depression may have altered the timing of behavior change among study women. Results showed that depressed study women significantly reduced nonmutual monogamy, unprotected sex with an untreated partner, and douching after sex at 0–6M follow-up. Nondepressed study women reduced some risky behaviors relative to nondepressed controls, but none significantly. They were approximately 50% less likely than controls to douche after sex, but P values were not significant. This may have been due to the relatively small cell size among nondepressed women and the instability created in point estimation. MD study participants had significantly lower rates of non-mutual monogamy and unsafe sex than MD controls. Additionally, SD study women were significantly lower than SD controls in douching after sex and having unprotected sex with an untreated partner.

At 6–12M follow-up, depressed study women continued to sustain significant reductions relative to controls in nonmutual monogamy and unsafe sex, indicating maintenance of change. By study's end, they also showed significantly lower rates than controls in rapid partner turnover. Nondepressed study women showed significant reductions, relative to control counterparts, in unsafe sex, douching after sex, and rapid partner turnover. Notably, effect sizes between nondepressed study and control women during this interval were frequently greater than those among depressed women. For example, the odds of practicing unsafe sex among nondepressed study women relative to controls was 0.3: 1; while among depressed women it was nearly double, or 0.6: 1.

In a previous publication, we noted the importance of context in considering behavior change.[39] We demonstrated the importance of considering multiple risk behaviors simultaneously to describe a woman's risk profile, and suggested the likelihood of reinfection with gonorrhea

and/or chlamydia increases with the number of risk domains confronting her, i.e. multiple behavioral risks represent cumulative exposure and increase the likelihood of reinfection. In this regard, depressed women were confronted with more risks than nondepressed women; they needed to change more behaviors than nondepressed counterparts to avoid infection and they did so. They reduced all five risk behaviors relative to controls, whereas nondepressed study women reduced fewer high-risk behaviors (only unsafe sex and douching after sex) during cumulative follow-up. However their absolute rates of most behavioral risks and reinfection were higher than those of their nondepressed counterparts, underscoring the persistent effect of depression.

Depression did not interfere with intervention efficacy. The Project SAFE intervention allowed depressed study women to make a wide variety of behavioral changes in sufficient magnitude to effect significant reductions in infection. Overall, results indicate that project SAFE worked at least equally well among depressed compared to nondepressed women, particularly in that depressed women appeared to make changes earlier, for a greater time and to a greater extent than nondepressed women. Whereas high retention rates strengthen generalizibility of the findings reported here, caution should be exerted in generalizing results to other high-risk women outside the groups studied, and in intervention settings that did not take into account the potentially high rates of depression in those participants.

Why Did SAFE Succeed among Depressed Women?

The SAFE intervention design and development was informed by findings from 18 months of ethnographic research among the target population.[38,57] The intervention accounted *a priori* for culture- and gender-specific needs of primarily undereducated, low-income minority women, and specifically targeted high-risk sexual behavior.[58] SAFE was a multi-dimensional intervention, and focused on relationship issues as well as more traditional aspects of unsafe sex. Significantly, it provided the knowledge, motivation and skills necessary to effect change in a comfortable, non-judgmental environment. In the non-judgmental intervention workshops, women were brought to understand that they deserve more out of relationships than what they often settle for. We believe that the content of these sessions, active intra-group discussions, and skills learned by participants helped provide the energy and empowerment needed for women to do something about their lives, despite their depression.

Although some studies have shown that depression can interfere with information processing, they have also noted that negative messages are more likely to be interfered with than positive messages.[30] In this case, SAFE provided positive messages achieved through focused intragroup discussions, role play and other activities which empowered women to change relational and other psychosocial aspects of their lives. It provided women with a more constructive way to recognize risk and make decisions regarding relationships and sexual behavior. Through workshop sessions, SAFE emphasized the positive gains to be achieved by sexual risk reduction (e.g., selectivity in relationships) and encouraged self-efficacy (e.g., active condom use negotiation) among participants. It appears that participants may have used knowledge and skills imparted by SAFE to make changes that they believed would reduce behavior risks despite feeling depressed. Perhaps the intervention imparted a sense of control which is often thought to be lacking among depressed persons, resulting in reduced interference with participant information processing.

Conclusion

To our knowledge, this study is the first to carefully examine the impact of depression on intervention efficacy in the context of a controlled, randomized trial. We recognize that because many women were depressed, in some cases cell sizes were small and point estimates were potentially imprecise due to power limitations. However, observed groupwise differences were

sufficiently large to provide a relatively convincing argument regarding the influence of depression on intervention efficacy in this case. In this study, depressed study women did as well and in certain aspects better than their nondepressed counterparts. We conclude that depressed women were amenable to changing their behavior given the impetus of the Project SAFE intervention and the empowerment it conferred.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

ACKNOWLEDGEMENTS

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Table 1

Baseline Characteristics of SAFE Participants by Depression Level

Variable	Entire Sample N = 477	No Depression (0–15) N = 122 (25.6 %)	Any Depression (16 +) N = 355 (74.4 %)	p*	Moderate Depression (16–27) N = 180 (37.7%)	Severe Depression (28 +) N = 175 (36.7%)	p*
	%	%	%		%	%	
Group							
Study	52.2	54.1	51.5	.63	48.9	54.3	.53
Control	47.8	45.9	48.5		51.1	45.7	
Race/Ethnicity							
African-American	31.2	36.1	29.6	.18	31.1	28.0	.34
Mexican-American	68.8	63.9	70.4		68.9	72.0	
Age (yrs)							
14 – 18	34.4	33.6	34.6	.84	32.8	36.6	.74
19 +	65.6	66.4	65.4		67.2	63.4	
Unemployed, <12 years education, and not in school	44.0	38.5	48.7	**.05**	46.7	50.9	.11
< 100% Poverty	78.4	66.4	82.8	**<.01**	80.4	85.1	**<.01**
Married	17.8	21.3	16.7	.25	16.7	16.7	.51
Currently Pregnant	28.5	25.4	29.6	.38	30.0	29.1	.67
History of Sexual Abuse	31.2	23.0	34.1	**.02**	27.2	41.1	**<.01**
Alcohol, 5 + Drinks "at a party"	22.4	19.8	23.6	.40	20.7	26.6	.29
Current Illicit Drugs	14.3	11.6	15.3	.10	12.3	18.5	.07

*
p values are based on Pearson's Chi-Squared Test

Table 2

Baseline Sexual Risk Behaviors of SAFE Participants by Depression Level

Variable	No Depression CES-D 0–15 N = 122	Any Depression CES-D 16 + N = 355			Moderate Depression CES-D 16–27 N = 180			Severe Depression CES-D 28 + N = 175		
	% (referent)	%	AOR[†]	P	%	AOR[†]	P	%	AOR[†]	P
Traditional Risk factors:										
Casual Relationship	32.8	47.9	1.8	<.01	43.3	1.6	.08	52.6	2.2	<.01
No Condoms, Past 3 mo	46.7	57.5	1.6	.04	56.7	1.5	.08	58.3	1.7	.04
2 + Partners, Past 3 mo	20.5	31.8	1.9	.02	30.6	1.8	.03	33.1	1.9	.03
SAFE Contextual Risk factors:										
Non-mutual monogamy	54.9	70.4	1.9	<.01	63.9	1.5	.10	77.1	2.7	<.01
Unsafe Sex	32.0	42.8	1.5	.04	37.8	1.1	.67	48.0	1.8	.03
Douching after Sex	25.6	32.7	1.4	.15	31.7	1.4	.24	36.7	1.5	.16

[†] Adjusted for race/ethnicity, age, poverty, abuse, and current drug use

Table 3

Comparison of Study and Control Women's Behavioral Risks and Reinfection at 0–6M Follow-Up

Risk Behavior	No Depression (CES-D 0 – 15)				Any Depression (CES-D 16 +)				Moderate Depression (CES-D 16 – 27)				Severe Depression (CES-D 28 +)			
	Study n=66	Cntrl n=56	AOR†	P	Study n=183	Cntrl n=172	AOR†	P	Study n=88	Cntrl n=92	AOR†	P	Study n=95	Cntrl n=80	AOR†	P
Non-Mutual Monogamy	27.3	30.4	0.7	.61	40.4	54.1	0.5	<.01	44.3	54.3	0.4	<.01	36.8	53.8	0.7	.52
Unsafe Sex	12.1	16.1	0.7	.47	23.0	32.6	0.6	.02	28.4	34.8	0.5	.03	17.9	30.0	0.7	.61
Douching After Sex	7.6	14.3	0.3	.09	8.7	14.5	0.4	.02	10.2	12.0	0.5	.09	7.4	17.5	0.3	.04
Rapid Partner Turnover	18.2	19.6	0.7	.84	20.8	23.8	0.8	.39	21.6	20.7	0.8	.78	20.0	27.5	0.9	.88
Sex with an Untreated Partner	9.1	7.1	1.1	.70	10.4	19.8	0.5	.02	10.2	17.4	0.5	.17	10.5	22.5	0.4	<.05
Reinfection Rate	9.1	14.3	0.6	.37	13.1	17.4	0.7	.42	15.9	17.4	0.7	.45	10.5	17.5	0.7	.36

† Adjusted for baseline (when available) and participant age

Table 4

Comparison of Study and Control Women's Behavioral Risks and Reinfection at 6–12M Follow-Up

Risk Behavior	No Depression (CES-D 0 – 15)				Any Depression (CES-D 16 +)				Moderate Depression (CES-D 16 – 27)				Severe Depression (CES-D 28 +)			
	Study n=66	Cntrl n=56	AOR†	P	Study n=183	Cntrl n=172	AOR†	P	Study n=88	Cntrl n=92	AOR†	P	Study n=95	Cntrl n=80	AOR†	P
Non-Mutual Monogamy	28.8	35.7	0.7	.82	38.3	48.3	0.6	.03	39.8	40.3	0.8	.72	36.8	57.5	0.4	<.01
Unsafe Sex	10.6	30.4	0.3	<.01	25.1	32.0	0.6	.02	25.0	28.3	0.7	.77	25.3	36.3	0.6	.08
Douching After Sex	1.5	10.7	0.1	<.05	8.2	11.1	0.5	.17	8.0	12.0	0.5	.13	8.4	10.0	0.7	.19
Rapid Partner Turnover	6.1	17.9	0.3	.05	12.6	24.4	0.5	<.01	12.9	22.8	0.5	.10	12.6	26.3	0.4	.01
Sex with an Untreated Partner					Pertaining to sex following initial infection in 0–6 followup; N/A during 6–12.											
Reinfection Rate	7.6	16.1	0.4	.11	9.3	16.9	0.5	.03	13.6	16.3	0.8	.62	5.3	17.5	0.3	.01

† Adjusted for baseline (when available) and participant age

Table 5

Comparison of Study and Control Women's Behavioral Risks and Reinfection at Cumulative 0–12M Follow-Up

Risk Behavior	No Depression (CES-D 0–15)				Any Depression (CES-D 16+)				Moderate Depression (CES-D 16–27)				Severe Depression (CES-D 28+)			
	Study n=66	Cntrl n=56	AOR†	P	Study n=183	Cntrl n=172	AOR†	P	Study n=88	Cntrl n=92	AOR†	P	Study n=95	Cntrl n=80	AOR†	P
Non-Mutual Monogamy	45.4	42.9	1.1	.92	55.7	68.6	0.5	<.01	53.4	62.0	0.5	.03	57.9	76.3	0.3	<.01
Unsafe Sex	16.7	35.7	0.3	.01	34.4	45.4	0.5	<.01	31.8	39.1	0.6	.05	36.8	52.5	0.5	.03
Douching After Sex	9.1	17.9	0.3	.05	12.0	18.6	0.4	.01	10.2	19.6	0.2	.01	13.7	17.5	0.6	.15
Rapid Partner Turnover	22.7	26.8	0.8	.65	27.9	34.3	0.4	<.01	29.6	31.5	0.9	.47	26.3	37.5	0.6	.10
Sex with an Untreated Partner	9.1	7.1	1.1	.70	10.4	19.8	0.5	.02	10.2	17.4	0.5	.17	10.5	22.5	0.4	<.05
Reinfection Rate	15.2	21.4	0.6	.14	18.6	27.3	0.6	.03	19.3	27.2	0.6	.09	17.9	27.5	0.6	.10

† Adjusted for baseline (when available) and participant age