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BRIEF REPORT

Depressive Symptoms and Sexually Transmitted Disease: Evidence from a Low-Income Neighborhood of New York City

Boshen Jiao[1,2] · Zafar Zafari[2,3] · Kai Ruggeri[4] · Sharifa Z. Williams[2,5]

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Abstract

We examined the association between sexually transmitted disease (STD) and depressive symptoms. Our analysis utilized the 2015 cross-sectional Washington Heights Community Survey. Multivariable binary logistic regression analysis was used to examine the primary association between having a history of STD and patient health questionnaire-9 (PHQ-9) score while adjusting for potential confounders. Then in separate models, we adjusted for the interaction of social factors with PHQ-9 score to test for modification effect on the primary association. In this low-income neighborhood, STD history was not significantly associated with PHQ-9 score in the overall logistic regression model for the primary association. However, in interaction models, STD and depressive symptoms were associated in sub-groups defined by social factors, namely being Hispanic [odds ratio (OR) 1.08; 95% confidence interval (CI) 1.02–1.15], foreign-born (OR 1.08; 95% CI 1.02–1.15), and having low to moderate social support (OR 1.09; 95% CI 1.02–1.15). Our results demonstrate a need for targeted interventions to be applied to vulnerable subgroups identified.

Keywords Depressive symptoms · Sexually transmitted disease · Low-income neighborhood · New York City

Introduction

Sexually transmitted diseases (STDs) are a substantial health challenge in the United States (US) where total cases reached a record high of over 2 million in 2017 (Centers for Disease Control and Prevention 2018a). Receiving proper treatment is crucial for curing STDs such as syphilis, gonorrhea, chlamydia, and trichomoniasis and avoiding complications like chronic pain and serious reproductive challenges (Chen et al. 2008; World Health Organization 2004, 2016). Other STDs, like HIV and genital herpes, are currently incurable but treatment can reduce or modify the symptoms of disease as well as offer improved quality of life (Basavaraj et al. 2010; World Health Organization 2016). Moreover, having an STD has been found to be comorbid with depressive symptoms, which can affect individuals' care seeking behavior (e.g. delayed presentation for care and late testing) and reduce treatment adherence and effectiveness (Chen et al. 2008; Gonzalez et al. 2011; Rane et al. 2018).

The association between having an STD and depressive symptoms may be causal or correlational (Chen et al. 2008; Nanni et al. 2015). Having an STD is associated with perceived stigma, discrimination, and other negative emotional consequences (Cunningham et al. 2009; Malta et al. 2007), which are also risk factors for depressive symptoms (Grov et al. 2010). Conversely, depressed individuals suffer from executive dysfunction and have a different perception and sensitivity towards reward and punishment, thus they are very likely to engage in sexual behaviors with high immediate "rewards" and high risk, such as having unprotected

✉ Boshen Jiao
bjiao@uw.edu

1 The Comparative Health Outcomes, Policy and Economics (CHOICE) Institute, University of Washington School of Pharmacy, 1959 NE Pacific Street, HSB H-375, Box 357630, Seattle, WA 98195-7630, USA

2 Global Research Analytics for Population Health, Columbia University Mailman School of Public Health, 722 W 168th St, New York, NY 10032, USA

3 Department of Pharmaceutical Health Services Research, University of Maryland School of Pharmacy, 20 N Pine St, Baltimore, MD 21201, USA

4 Department of Health Policy and Management, Columbia University Mailman School of Public Health, 722 W 168th St, New York, NY 10032, USA

5 Social Solutions and Services Research, Nathan S. Kline Institute for Psychiatric Research, 140 Old Orangeburg Road, Bldg. 35, Orangeburg, NY 10962, USA

sex, having multiple sex partners, or trading sex for money or drugs (Hutton et al. 2004; Shrier et al. 2002; Tull and Gratz 2013).

Regardless of causality, the association between having an STD and depressive symptoms may differ in magnitude and direction by certain sociodemographic characteristics. Previous studies found that women, young people, racial-ethnic minorities, those who are married, those who lack social support and have poor socioeconomic circumstances were at higher risk for having STDs and experiencing STD-related stigma, discrimination, and even violence when compared to counterparts (Centers for Disease Control and Prevention 2018b; Charles et al. 2012; Earnshaw et al. 2013; Hood and Friedman 2011; Logie and Gadalla 2009). This puts them at risk for also experiencing depressive symptoms (Gao et al. 2010; Huang et al. 2018; Khan et al. 2009; Magidson et al. 2014). Given the protracted challenges to public health in the US and particularly in urban areas with diverse populations, understanding comorbidity in the context of mental illness and STDs is critical for effective treatment and policy (Ford et al. 2017).

The 2015 Washington Heights Community Survey (WHCS) samples a unique community in New York City (NYC), which is predominantly Hispanic and low-income. Over two-thirds of Washington Heights' residents are Hispanic, which is more than two times their prevalence in Manhattan and NYC (U.S. Census Bureau 2010; Williams et al. 2017). The American Community Survey reports that over 40% of Washington Heights residents have annual household income less than $20,000 compared to 19.4% and 22.1% in Manhattan and NYC, respectively (U.S. Census Bureau 2010; Williams et al. 2017). As low-income, minority ethnic groups are at high risk of both STD and depressive symptoms, there is particular utility to investigating the association between those two using the 2015 WHCS. Further, we examined whether this primary association differed by sociodemographic factors.

Methods

Data

For these analyses, we utilized data from the 2015 WHCS, a cross-sectional survey of residents of Washington Heights, NY (zip codes 10032 and 10033) aged 18 years and older conducted by the Mailman School of Public Health at Columbia University (Williams et al. 2017). The aim of the WHCS was to describe sociodemographic characteristics, burden of disease, health behaviors, and access to health care resources in the Washington Heights community. Sensitive questions about sexually transmitted diseases (STDs), sexual behavior, and mental health were included in an interactive voice response (IVR) module, which provided respondents the option of hearing recorded versions of the questions and responses and answering using their phone keypad rather than answering to a live interviewer.

A total of 2511 interviews were conducted with an American Association for Public Opinion Research response rate of 16.8% (Williams et al. 2017). Prior to analyses survey weights were developed to account for differential probabilities of selection among households due to the study design, survey non-response, and to ensure that the sample was representative of the population of Washington Heights, New York (Williams et al. 2017). For this study, we used the data of the 1167 residents with valid responses on measures of interest.

Measures of Interest

To measure our outcome, having a history of STD, we utilized respondent report of ever being diagnosed with at least one of five STDs: HIV, genital herpes, syphilis, gonorrhea, or chlamydia. The independent variable of primary interest was currently expressing depressive symptoms as determined by the patient health questionnaire-9 (PHQ-9) which was administered as part of the survey. The PHQ-9 scores each of nine Diagnostic and Statistical Manuals of Mental Disorders-Version 4 (DSM-IV) criteria on depressive and other mental disorders from "0" (not at all) to "3" (nearly every day) (Kroenke et al. 2001). We used the total PHQ-9 score (ranges from 0 to 27) to measure depressive symptoms. Participant sociodemographic characteristics, level of social support, and risk behaviors were assessed as potential effect modifiers or confounders.

Sociodemographic variables of interest included age (18–44 years, 45–64 years, or 65 + years), race/ethnicity (White, Hispanic, Black, or Other), nativity (indicator for being born outside the US), education (less than college, or college and above), income (low, or high and middle income) and marital status (married/cohabited, or currently single). Level of social support was assessed using three survey questions on how often the respondent had someone to (1) help them when confined to a bed, (2) give them good advice about a crisis, and (3) love and make them feel wanted. Responses to each question ranged from none of the time (a score of 1) to all of the time (score 5). The total sum of scores from the three questions were categorized as low to moderate social support (total score less than or equal to 10) and high-level social support (11 to 15). Risk behaviors included alcohol use, smoking status and lifetime drug use.

Statistical Analysis

To determine whether there was a significant association between having an STD and depressive symptoms, a

multivariable binary logistic regression of having an STD on PHQ-9 score adjusting for sociodemographic factors, level of social support, and risk behaviors was conducted.

We then used separate regression models to assess potential modification effects of each sociodemographic factor as well as level of social support on the primary association between STD and PHQ-9 score. To achieve this analytically, a statistical interaction between PHQ-9 score and the measure of interest was included in the initial multivariable logistic regression model of having an STD on PHQ-9 score. This resulted in eight models; one testing for the modification effect of each measure.

Survey weights were utilized in all statistical analyses. All analyses were conducted using Stata 15.

Results

Nearly one-fifth of residents had ever been diagnosed with an STD, and the average PHQ-9 score in the sample was 4.0. In the overall model, where having an STD was regressed on PHQ-9 score adjusting for potential confounders, we found no significant association between PHQ-9 score and having an STD [odds ratio (OR) 1.03; 95% confidence interval (CI) 0.97–1.08; p value = 0.333]. In the stratified analyses, we found that models stratifying on race-ethnicity, nativity, and level of social support produced significant modification effects. Findings show statistically significant association between PHQ-9 score and having an STD among Hispanic residents (OR 1.08; 95% CI 1.02–1.15; p value 0.009) such that each additional unit in PHQ-9 score was associated with an 8% higher odds of having an STD; PHQ-9 score and STD were not significantly associated in other race-ethnicity strata. The association between PHQ-9 score and having an STD was also significant among foreign-born (OR 1.08; 95% CI 1.02–1.15; p value 0.013) but not among US born residents; and residents with low to middle (OR 1.09; 95% CI 1.02–1.15; p value 0.007) social support, but not for those with high social support.

Discussion

Our study used a unique cross-sectional sample from the Washington Heights neighborhood in New York City and found no overall significant association between having an STD and depressive symptoms. However, when we investigated whether the primary association differed by subgroups defined by sociodemographic characteristics and social support, we observed a significant association between having an STD and depressive symptoms among Hispanics, foreign-born residents, and residents with a low- or mid-level social support.

Conversely, a 2008 Canadian study showed an overall significant association between STDs and depression (Chen et al. 2008). They conducted the cross-sectional study among general Canadian population and utilized 2013 Canadian Community Health Survey which included 21, 560 participants aged 15–49 years (Chen et al. 2008). This discrepancy in findings might be due to differences in sample size or study populations. Not only is the sample size in the Canadian study much larger, our study population was restricted to an urban, predominantly low-income Hispanic community in the US, while theirs was more broad.

Our findings of a significant association between having an STD and depressive symptoms among Hispanics and foreign-born residents in the US have been previously supported in the literature. Previous studies have shown that STD-related stigma is highly prevalent among Hispanic residents, particularly for those who were not born in the US (Darrow et al. 2009; Grieb et al. 2017). It is common that the first-generation of Hispanic immigrants still maintain the social norms and values of sexual behaviors from their original countries, such as sexual silence (Villar-Loubet et al. 2011). Further, the Hispanic community traditionally adopts stigmatizing attitudes and beliefs towards STDs (Darrow et al. 2009; Grieb et al. 2017). The fear of being judged by their peers for "immoral" and "irresponsible" sexual behaviors resulting in an STD, leads to isolation from community and family (Dang et al. 2012; Grieb et al. 2017). This stress associated with STD-related stigma as an immigrant, is often exacerbated by the more universal worry of losing employment due to the illness (Sauceda et al. 2013).

Depression increases susceptibility to risky sexual behaviors which can lead to an STD (Hutton et al. 2004; Shrier et al. 2002). Further, depression is largely under-diagnosed and under-treated in the US (Jiao et al. 2017) with many access barriers relating to affordability and not knowing where to find care (Jiao et al. 2017; Walker et al. 2015). However, people with broad social networks are more likely to seek financial assistance and access information about available mental health care from their network members (Cohen 2004). Also, having social support from family members and close friends is related to lower likelihood of engaging in high-risk sexual behaviors (Deren et al. 2011; Mazzaferro et al. 2006). Besides, emotional support from families or friends can serve as a protective factor against the fear of STD-related stigma, strengthen self-esteem, and increase sense of belonging (Galvan et al. 2008; Li et al. 2009).

Our study results are subject to several important considerations. Firstly, using self-reported data might induce bias. Although an IVR module was used to administer questions on sensitive topics, there may be unmeasured differences in the veracity of response because of perceived stigma associated with issues concerning mental health and

STDs. Secondly, our study results are only generalizable to populations with similar characteristics as ours. Thirdly, we included the continuous PHQ-9 score in our analysis rather than a dichotomous variable indicating case of depression. This might be less clinically meaningful. However, not only is continuous PHQ-9 score used in important published studies (Bengtson et al. 2016; Wagner et al. 2014; Whetten et al. 2013; Whooley et al. 2008), it is also increasingly used for screening in clinical settings (Kroenke and Spitzer 2002; Richardson et al. 2010). Fourthly, due to the limitation of the questionnaire, the residents with treated STDs were not distinguished from untreated cases, which might attenuate the association of our interest. Finally, it is important to highlight that the direction of effects was not the focus of this study. That is, no causal conclusion could be made for our findings about the relationship between having an STD and depressive symptoms. Future studies with an appropriate study design should provide insights on any potential causal association between having an STD and depressive symptoms.

While there was no observed association between having an STD and depressive symptoms in our overall study sample, we found important effect modification in subgroups defined by sociodemographic characteristics and social support. This demonstrates a clear opportunity for targeted policy interventions, both at the clinical and public health levels, to be applied to vulnerable subgroups identified in our study. Such policy interventions could be both in terms of prevention or treatment for STDs and depressive symptoms. For instance, individuals in vulnerable subgroups should be monitored for co-morbid depressive symptoms and STD. Monitoring could include referral to screening policies, improving education about sexual or mental health, or close contact with community-based programs outside of primary care (Schumacher et al. 2013). However, realizing such monitoring programs in practice is challenging (Magaña et al. 2007; Rios-Ellis et al. 2015; Wohl et al. 2013), and evaluation of their impact is warranted.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflicts of interest.

Ethical Approval The Review by and approval from the appropriate institutional and/or national ethical review committee was not needed in this study because the 2015 Washington Heights Community Survey (WHCS) dataset is publicly available: http://www.gssndi.com.

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