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Impact of psychiatric and social characteristics on HIV sexual risk behavior in Puerto Rican women with severe mental illness

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Abstract

Background—Latinos in the United States have been identified as a high-risk group for depression, anxiety, and substance abuse. HIV/AIDS has disproportionately impacted Latinos. Review findings suggest that HIV-risk behaviors among persons with severe mental illness (SMI) are influenced by a multitude of factors including psychiatric illness, cognitive-behavioral factors, substance use, childhood abuse, and social relationships.

Objective—To examine the impact of psychiatric and social correlates of HIV sexual risk behavior in Puerto Rican women with SMI.

Methods—Data collected longitudinally (from 2002 to 2005) in semi-structured interviews and from non-continuous participant observation was analyzed using a cross-sectional design. Bivariate associations between predictor variables and sexual risk behaviors were examined using binary and ordinal logistic regression. Linear regression was used to examine the association between significant predictor variables and the total number of risk behaviors the women engaged in during the 6 months prior to baseline.

Results—Just over one-third (35.9%) of the study population ($N = 53$) was diagnosed with bipolar disorder and GAF scores ranged from 30 to 80 with a median score of 60. Participants ranged in age from 18 to 50 years ($M = 32.6 \pm 8.7$), three-fourths reported a history of either sexual or physical abuse or of both in childhood, and one-fourth had abused substances in their lifetimes. Bivariate analyses indicated that psychiatric and social factors were differentially associated with sexual risk behaviors. Multivariate linear regression models showed that suffering from increased severity of psychiatric symptoms and factors and living below the poverty line are predictive of engagement in a greater number of HIV sexual risk behaviors.

Practical implications—Puerto Rican women with SMI are at high risk for HIV infection and are in need of targeted sexual risk reduction interventions that simultaneously address substance abuse prevention and treatment, childhood abuse, and the indirect effects associated with SMI such as living in poverty. Mental health programs should address risk behavior among adults with SMI in the context of specific symptomatology and comorbidities.

Keywords

HIV sexual risk behavior; Severe mental illness; Puerto Rican; Psychiatric history profile

Background

Approximately 6% of the United States (US) population suffers from severe mental illness (SMI) that causes extensive disability and can persist over time [36, 50]. Seroprevalence studies have revealed HIV-infection rates ranging from 4 to 23% among adults with SMI, with an average of 7.8% compared with the recently estimated rate of 0.8% in the general US population [20, 49, 63, 67, 82]. Co-occurring substance use disorders, identified as potent risk factors for the development of HIV infection, are estimated to occur in approximately half of persons with SMI [22, 60, 61]. Substance abuse can intensify psychotic symptoms and impede judgment and impulse control in persons with psychiatric illness leading to higher risk for HIV due to unsafe sexual practices [25].

Multiple sex partners, high-risk partners, sex trading (exchanging sex for basic needs including money, food, drugs, or shelter), and infrequent or no condom use are common and more likely among persons with SMI compared to persons without SMI [7, 49]. Review findings suggest that HIV-risk behaviors among persons with SMI are influenced by a multitude of factors including psychiatric illness, cognitive-behavioral factors, substance use, childhood abuse, and social relationships [49, 50]. A recent review indicates that individuals with SMI can benefit from sexual risk reduction interventions that help to promote patients' sexual health and prevent the spread of HIV [77].

Among SMI, sexual risk behaviors have been consistently associated with substance use, substance abuse severity, and lifetime substance use disorder [6, 9, 32, 50, 85]. Individuals with co-occurring SMI and substance use disorders are at significantly greater risk for HIV infection compared to individuals with a single psychiatric diagnosis [8, 44]. Composite measures of HIV risk have been associated with alcohol use [6, 9, 32, 57, 68, 85], illicit drug use [9, 32, 68], substance use disorder [9, 16, 85], and having intercourse while intoxicated [32, 85]. Illicit drug use was also directly associated with increased HIV risk, and alcohol use was indirectly associated with HIV risk through drug use [68].

Several studies have indicated that future HIV prevention research in psychiatric populations should consider differentiating among diagnoses and further investigating diagnosis-specific associations with risk behaviors [10, 43, 71, 81, 84]. Numerous studies, however, have found diagnosis to be unrelated to risky sexual behaviors [5, 6, 9, 16, 18, 35, 45, 46, 68], such as not using condoms, having multiple partners [5, 16, 18, 35, 43, 45, 46, 79], and engaging in sex trading [5, 6, 9, 16, 45] and that psychiatric symptoms may be more predictive of sexual risk behaviors than mental illness diagnosis [19, 46, 49, 68, 86]. A study of schizophrenia patients revealed that having multiple partners was associated with the positive symptom cluster of the positive and negative syndrome scale (PANSS) [19]. Two studies indicated that greater psychiatric symptoms were associated with increased HIV risk [46, 68]. Results based on cross-sectional data from two other samples showed that positive symptoms such as delusions, grandiosity, and paranoia were associated with multiple partners and injection drug use while excitement symptoms such as poor impulse control,

hostility, and tension were associated with sexual activity and sexual trade [49]. A study of patients in methadone programs revealed that elevated psychiatric symptomatology was associated with sustained HIV-risk behaviors as well as HIV seroconversion [86].

This study, premised on social cognitive theory, examines the association of psychiatric and social characteristics and HIV sexual risk behaviors in a sample of Puerto Rican women with SMI. The social environment is an essential element in learning processes and behavior change in social cognitive theory [31] where internal cognitive/affective states and the environment have a jointly determinant relationship with behavior [2]. Since the Latino community in the US has a disproportionately high prevalence of HIV, high risk behaviors among Latina women with SMI may result in a greater likelihood of HIV infection compared to the general SMI subpopulation [12]. While Latinos comprised 14.4% of the US population in 2005, they accounted for 18.9% of persons who received an AIDS diagnosis [13]. In 2006, Latinos accounted for 18% of the estimated 54,230 new HIV infections based on incidence in 22 states included in the analysis and extrapolated to the 50 states and the District of Columbia [15]. The most common exposures for Latinas living with HIV/ AIDS are high-risk heterosexual contact (69%) and injection drug use (IDU) (29%) [11]. Puerto Rican women specifically have been found to be less likely to use condoms in relationships of longer duration and increased emotional investment [39, 75]. To date, information concerning the connection between substance abuse, traumatic abuse, and SMI and the risk for contracting HIV among Puerto Rican women is lacking [25]. The primary objective of this research was to examine the impact of psychiatric and social correlates of HIV sexual risk behavior in the Puerto Rican women. The main hypothesis assumed that there is a differential association between sexual risk behaviors and various psychiatric and social factors and that composite risk would increase with greater severity of symptoms, factors, and comorbidities.

Methods

Participant characteristics and study design

Criteria for participation in the study included a diagnosis of major depression, bipolar disorder, or schizophrenia; Puerto Rican ethnicity; residence in Cuyahoga County; capacity and willingness to provide informed consent; and being female aged 18–50 years, inclusive, at baseline. SMI was defined as major depression, bipolar disorder, or schizophrenia to reflect the categories used by the National Institute of Mental Health to define SMI in the context of HIV prevention research at the time of the study. Individuals were recruited between October 2002 and December 2005 through physicians, social workers, and case managers at outpatient mental health clinics, inpatient mental health facilities, community-based clinics, and drug and alcohol rehabilitation centers. Individuals were also recruited through solicitation at churches and church-based counseling centers using posters, flyers, and presentations to support groups. Community awareness of the study was raised through presentations in vocational classes and through distributing flyers in a variety of venues.

Individuals who expressed interest were approached for their informed consent to participate in a baseline interview to assess eligibility. Eligible participants were asked for their informed consent for an additional baseline interview, two follow-up, semi-structured interviews conducted once a year for 2 years, and up to 100 h of non-continuous participant observation (shadowing). No situations involving questionable capacity arose, and all study procedures were approved by the IRB. Study participants received monetary compensation totaling \$65 for the interviews. No compensation was provided for shadowing.

The diagnosis of mental illness and the global assessment of functioning (GAF) score of all participants were obtained using the structured clinical interview for axis I DSM-IV

diagnoses (SCID) [74]. Diagnoses made during the study were validated against medical records with the consent of the participants. In the few instances that discrepancies in diagnoses or symptoms were found, the records were reviewed by the principal investigator and the study psychiatrist. A final determination of diagnosis was made based on a review of both the prior medical records and the study assessment, recognizing that the symptoms displayed by an individual may have fluctuated at various points in time. For example, an individual may have been diagnosed initially with major depression and only years later experienced mania, leading to a changed diagnosis of bipolar disorder. Semi-structured interviews including standardized quantitative measures were conducted to assess substance use and HIV-risk behaviors.

Shadowing included informal, tape-recorded visits with participants and their family members and attending a variety of activities including but not limited to church, doctor's appointments, court appearances, and children's birthday parties. Individual shadowing episodes generally lasted from 1 to 3 h during which ethnographers asked open-ended questions that focused on the following domains: sexual attitudes and behaviors, past and current drug use, HIV knowledge, past and current family and partner violence, religious beliefs and attitudes, family dynamics, socioeconomic factors, and cultural values. The women were shadowed for an average of 24.8 h (median 18.0, range 1–100). Data acquired using quantitative measures were supplemented by qualitative data gathered in the interviews and collected longitudinally during the study period through shadowing. Comparing participants' actual behavior with their reports of their behavior in the interviews served as a method of triangulation. This approach allowed for dismissing possible alternative explanations and resulted in a truthful proposition regarding a particular phenomenon [41]. All interviews and ethnographic observations were carried out by highly trained, bilingual (English and Spanish) staff.

Measures

Psychiatric history profile—Nine lifetime psychiatric symptoms or factors were initially considered in bivariate analyses including hallucinations, violent behavior, attempted suicide, GAF score, number of psychiatric hospitalizations, comorbid axis II or posttraumatic stress disorders (PTSD), suicidal ideation, self-injurious behavior, and criminal justice involvement. Similar measures have been used in studies assessing psychiatric correlates of childhood abuse and HIV-risk behavior. For example, lifetime symptoms including hallucinations, violent behavior, and attempted suicide were considered in association with abuse history and HIV-risk behaviors among substance abusing adults with SMI [40]. Several studies have also looked at global functioning (GAF) and number of psychiatric hospitalizations in relation to HIV risk [10, 19, 32, 46], and a comorbid axis II diagnosis has been associated with higher risk for HIV infection in the SMI population [71, 72]. Another study analyzed how adverse childhood events predicted functional mental health and physical health in persons with schizophrenia by considering suicidal thoughts, self-injurious behavior, suicide attempts, psychiatric hospitalizations, criminal justice involvement, and PTSD among other factors [65]. In yet another study, PTSD was found to partially mediate the relationships between CSA and various HIV-risk behaviors [83]. As PTSD is common among adults with SMI [51, 66], it may mediate the negative effects of sexual trauma on the course of SMI and on subsequent HIV risk [52].

A psychiatric history profile (PHP) was created for use in multivariate analysis. Participants received a score out of 100 possible points for each psychiatric symptom or factor significantly associated with at least one sexual risk behavior in bivariate analyses. For example, individuals who had never attempted suicide received a score of zero while those who had attempted suicide once received a score of 50 and those who had attempted it more

than once received a score of 100. A total score comprising the sums of the individual scores for each significant symptom and factor was obtained and a mean was calculated to produce individual PHP scores on a continuous scale. Higher values indicated greater symptomatology and experience with psychiatric-related factors. Internal reliability for this scale was good (Cronbach's $\alpha = 0.70$).

Substance use—Substance use and abuse were assessed with the addiction severity index (ASI) which evaluates medical status, employment and support, drug use, alcohol use, legal status, family/social status, and psychiatric status [47]. The ASI has shown high concurrent and interrater reliability (0.74–0.93) and validity and has been shown to be adequate when used with a mentally ill population [30, 40].

Childhood abuse—As in recent studies [37, 48, 70], childhood abuse encompassed sexual and physical abuse in this study due to the difficulty in distinguishing the unique effects of the often co-occurring abuses [3, 25, 65]. Childhood sexual abuse (CSA) was defined as abuse involving forced penetration in the form of vaginal, anal, or oral intercourse prior to the age of 13 years. Childhood physical abuse was defined as physical harm caused by another person such as punching, beating, or slapping prior to the age of 18. Participants were questioned regarding abuse during the semi-structured interviews and during shadowing. In some cases, abuse was also recorded during administration of the SCID.

Previous reports indicate that 43–52% of women with SMI report a history of CSA [48, 65] and 33–52% report a history of childhood physical abuse [51, 65] compared to 13–32 and 20–21%, respectively among women in the general population [3, 17, 26]. In the SMI population, childhood abuse has been found to be associated with depression, psychosis, dissociation, and posttraumatic stress [21, 40] and emerging evidence suggests a relation to HIV-risk behaviors [4, 25, 40, 48, 50, 83].

Relationship status—Participants reported whether they were involved in a romantic relationship in the form of marriage or living with a partner during the 6 months prior to baseline or whether they had been divorced or separated before the 6-month period preceding baseline and thus without a romantic partner. In general, adults with SMI encounter difficulty in maintaining long-term relationships; across reviewed studies, the vast majority of participants have been single [49, 50]. Studies have shown that married persons are more likely to be sexually active, and persons with primary partners are less likely than those with multiple partners to use condoms [6, 9, 16, 23, 50, 57]. Single adults are more likely to trade sex [32].

Demographic information—Participants reported their age at baseline, number of children, place of birth, primary language, primary source of income; education level, poverty status (determined by looking at poverty line data for US in 2006) and employment status.

HIV sexual risk behaviors—Five HIV sexual risk behaviors measured 6 months prior to baseline were considered: having unprotected intercourse, sex trading, having multiple sex partners, having intercourse while participant and/or partner was high on alcohol or other drugs, and having an IDU sexual partner. Similar measures have been used in numerous other studies [25, 38, 48, 53, 58, 73, 83]. Initially, the risk factors were considered independently in bivariate analyses since sexual behaviors have been found to be differentially associated with psychiatric symptoms, substance abuse, CSA, and romantic partnerships [50]. The risk behaviors were then summed to create a continuous index of the

total number of risk behaviors coded as either present or absent where multiple factors indicated higher risk. Similar approaches have been employed previously to estimate an HIV risk composite [25, 81].

Analysis

The mixed methods data analysis process used in this study incorporated data reduction, data display, data transformation, data correlation, data consolidation, data comparison, and data integration [55]. Data reduction involved exploratory thematic analysis of the qualitative data and descriptive analysis of the quantitative data [55]. Data display involved describing the data pictorially using charts and networks for the qualitative data and tables and graphs for the quantitative data. Data transformation, during which quantitative data are converted into narrative data that can be analyzed qualitatively (*qualitized* [80]) and/or qualitative data are converted into numerical codes that can be represented statistically (*quantitized* [80]) represents an optional stage. During the data transformation stage, qualitative data were *quantitized* [80]. The data correlation stage involved qualitative data being correlated with any *quantitized* [80] data. Data comparison involved comparing data from the qualitative and quantitative data sources and data integration provided a means to integrate the two types of data into a coherent whole [55]. Qualitative data from this study have also been analyzed independently [28].

Most (~75%) shadowing activities were tape recorded, transcribed in the original language and translated into English if necessary. Qualitative data gathered during shadowing were examined for patterns, themes, and categories in response to open-ended questions. Data were coded using Atlas.ti 5.0 software on an ongoing, line-by-line basis with each paragraph receiving as many codes as necessary to describe its contents. Meetings were held at which all staff members evaluated the coded data. Any disagreements concerning coding were resolved through a consensus process. The codes that emerged were developed into qualitative response categories. The coded qualitative data were quantified into the dichotomous variables 0 or 1 based on the absence or presence of each coded response. Data obtained using structured instruments and the *quantitized* [80] data obtained from shadowing were combined in a data set for analysis. All statistical analyses were performed using SAS version 9.1.

Bivariate associations between potential predictor variables and sexual risk behaviors were examined initially using binary and ordinal (for multiple partner categories) logistic regression. Predictor variables that were associated with a risk outcome at $P = 0.10$ were simultaneously entered into multivariate linear regression models testing for the influence of the predictors on the levels of HIV risk behavior as a composite outcome. Linear regression analysis was used to examine the association between significant predictor variables and the total number of risk behaviors the women engaged in during the 6 months prior to baseline. An HIV risk index was used to identify correlates of engagement in multiple HIV risk behaviors. Using an HIV risk composite provided a means to assess the strength of associations between predictor variables and HIV-risk behaviors while simultaneously adjusting for multiple covariates.

Before constructing multivariate models, bivariate correlation analyses were used to determine whether collinearity existed among significant predictor variables and to identify correlates of engagement in multiple HIV-risk behaviors. Three linear regression models were constructed: one model contained all predictor variables associated with a risk outcome at $P = 0.10$. The second model consisted of the PHP variable and predictors significantly associated with risk outcomes at $\alpha = 0.05$ or 0.01 in bivariate analyses while the third model contained the PHP and poverty variables that were significantly associated with HIV-risk behavior in previous linear regression models. The assumptions of linear regression were

tested by constructing plots of residuals versus predicted values and plots of residuals versus independent variables, by calculating Durbin–Watson statistics, and by constructing normal probability plots and histograms of the residuals. Statistical significance in multivariate analyses was determined at the $\alpha = 0.05$ level.

Results

A sample of 53 Puerto Rican women comprised the study population. Approximately 20% of individuals approached to participate in the study did not meet the eligibility criteria. An additional 20% of the women who were approached for their participation declined prior to a determination of study eligibility. Demographic information is summarized in Table 1. Just over one-third (35.9%) of the women were diagnosed with bipolar disorder, 52.8% were diagnosed with major depression and 11.3% were diagnosed with schizophrenia. Participants ranged in age from 18 to 50 years and three-fourths of them reported a history of either sexual or physical abuse or of both in childhood.

Women who had engaged in any of five sexual risk behaviors 6 months prior to baseline were categorized according to type or extent of involvement in each behavior (Table 2). Almost two-thirds (62.2%) of women who had more than one partner reported no condom use 6 months prior to baseline. Overall, the median number of risk factors per participant was two (32.1%) and ranged from none (9.4%) to five (17.0%).

Approximately 30% of the participants had experienced either auditory or visual or both types of hallucinations, and 15.1% had been hospitalized for psychiatric reasons five or more times (Table 3). Eighteen (58.1%) of the 31 women who had tried to commit suicide had attempted it more than once. The median PHP score was 34.4/100 (range 3.3–90.0).

Binary and ordinal logistic regression were used to predict participation in five sexual risk behaviors (Table 4). Women who had been abused in childhood were more likely to have six or more sexual partners compared to women with no history of abuse [15 vs. 0%; odds ratio (OR) = 3.06, $P = 0.08$]. Having sex with an IDU was associated with a lower GAF score (OR = 0.92, $P = 0.01$), with attempting suicide (92.9 vs. 47.4%; OR = 14.44, $P = 0.009$), with having any type of hallucinations (71.4 vs. 15.8%; OR = 13.33, $P = 0.0005$), and with having a comorbid disorder (28.6 vs. 5.3%; OR = 7.2, $P = 0.04$). Women who traded sex were more likely to be employed at baseline (55.6 vs. 25.7%; OR = 3.61, $P = 0.04$), to have been charged with a crime (50.0 vs. 14.3%; OR = 6.00, $P = 0.008$), and to have perpetrated violent behavior (72.2 vs. 40.0%; OR = 3.90, $P = 0.03$). The confidence intervals for several of these estimates were quite large, likely due to the uneven distribution of participants with particular psychiatric or social factors engaging in particular risk behaviors and the resulting smaller sample sizes (Table 4).

Bivariate correlation analyses revealed that PHP was positively correlated both with childhood abuse ($r = 0.35$, $P = 0.01$) and with substance abuse ($r = 0.52$, $P < 0.0001$). Both psychiatric profile ($r = 0.31$, $P = 0.03$) and poverty ($r = 0.29$, $P = 0.03$) were associated with the composite of the total number of sexual risk behaviors. Three linear regression models are presented in Table 5. The assumptions of linear regression were not violated in any of them. Incorporating all of the variables found to be significantly associated at $P \leq 0.10$ with the sexual risk behaviors in the bivariate analyses in Model 1 accounted for 21% of the variance in the total number of HIV-risk behaviors.

In Model 2, variables that had more than a marginal association with individual behaviors were simultaneously entered; these variables account for 21% of the variance in HIV. The standardized regression coefficients in this model show that severity of PHP and poverty contributed the most to predicting the level of HIV risk. Model 3 is based on the results from

bivariate correlation analyses and includes variables that were significantly associated with the composite HIV level outcome. Severity of PHP and poverty contribute similarly in explaining 16% of the variance in levels of risk behavior in this model. Based on model statistics, Model 2 appears to be the best fit for the data where a higher PHP score ($\beta = 0.30$, $t = 2.34$, $P = 0.02$) and poverty ($\beta = 0.29$, $t = 2.21$, $P = 0.03$) significantly predicted HIV sexual risk behavior. This model revealed that Puerto Rican women with SMI who engaged in a greater number of sexual risk behaviors had experienced greater symptomatology related to their illness and lived in poverty.

Discussion

Our findings demonstrate that factors related to psychiatric illness, substance abuse, childhood abuse, and demographic characteristics are at least marginally associated with one or more sexual risk behaviors in this sample of Puerto Rican women with SMI. Bivariate analyses showed that these factors were differentially associated with sexual risk behaviors. Multivariate analysis revealed that suffering from a greater number and increased severity of psychiatric symptoms and factors and living below the poverty line are predictive of engagement in a greater number of HIV-risk behaviors. Several studies involving SMI populations have demonstrated that more severe psychiatric symptoms are predictive of greater HIV risk [10, 46, 50, 64, 68]. Consistent with results from other studies, the women with SMI in this sample demonstrated a variety of highly risky sexual behaviors including sex with multiple partners, sex with an IDU, unprotected sex, sex trading, and sex while high on drugs or alcohol.

Comparisons with other studies

Previous studies have indicated that the association between substance use disorders and HIV risk may vary by the type of substance abused and the manner in which HIV risk is defined. Although estimates have revealed that approximately half the adults with SMI have substance use disorders [60, 61], in our sample, only 24.5% of the women had abused substances in their lifetimes. Our analyses did not differentiate between type of substance abused which may have led to an attenuated association. Substance abuse in the current study was only marginally associated with having sex with an IDU and with trading sex. Recent studies have shown that partner substance use is a risk factor for partner violence in Latino populations [27, 76] which may have had an impact on the risky behaviors of the current study participants. In 2003, IDUs accounted for 40.3% of AIDS cases diagnosed in the US among Latino men and 12.4% among Latino women [62]. These percentages indicate that IDU is more common among Latino men; it is possible that IDU is a more acceptable behavior for men in this culture.

Few studies have examined childhood abuse as encompassing both physical and sexual abuse in relation to HIV risk behavior in the SMI population. One cross-sectional study revealed that childhood abuse was directly and indirectly associated with lifetime HIV risk [48]. Another study found that a history of sexual abuse significantly predicted HIV risk, while a history of physical abuse was not predictive [25]. In our study, childhood abuse was only associated with having sex with multiple partners 6 months prior to baseline in bivariate analyses. Previous univariate analyses (data not shown) also indicated that women reporting a history of CSA were significantly more likely to engage in higher HIV risk behavior.

Contrary to previous findings that participants with a steady romantic partner were more likely to report unprotected intercourse [23, 50, 57], being in a romantic relationship for at least 6 months was not significantly associated with unprotected intercourse in our study. In some cases, Latina women may be more reluctant to discuss condom use with their partners,

fearing emotional or physical abuse or the withdrawal of financial support [78]. *Marianismo*, the expectation that women are pure and will concede to men's desires and *simpatia*, the importance of nonconfrontational relationships, are two behaviors associated with traditional gender roles that, when combined with sexual silence, can inhibit Latina women from discussing sexual issues and negotiating safe sex with male partners [1, 54, 59]. In our study, this may also have affected women who had partners for less than 6 months at baseline.

Our findings also revealed that poverty was associated with having sex while high on drugs or alcohol and with an overall increased level of HIV risk. This supports previous findings indicating that the risk of HIV infection may be directly or indirectly increased by socioeconomic problems associated with poverty in the US Latino community; more than one in five Latinos lives below the poverty line [24]. Such problems may include a lack of formal education, unemployment, inadequate health insurance, and limited access to high-quality health care [12].

Strengths and limitations

Our study has a number of strengths. By restricting the sample to one sex and ethnicity, any potentially confounding effects of these characteristics that would be harder to control for with a small sample size were removed. Using methods that recruited participants from both healthcare facilities and community venues enhanced the generalizability of results.

Previous studies recruited participants from treatment sites and thus results may not be generalizable to persons with SMI who do not seek or receive mental health specialty care [42, 49]. However, the rates of suicidal ideation (86.8%) and suicide attempts (58.5%) in this sample of women with SMI were quite high considering that in Latino groups, being of Catholic faith with frequent church attendance; *familism*, the supportive quality of the Latino family; and *fatalism*, the belief that one's life is predetermined by fate act as recognized protective factors against suicidal behavior [56]. While not conclusive, our findings suggest that individuals who are multiply marginalized, isolated and/or stressed due to language, migration, abuse history, mental illness, and substance use may be at particularly high risk of suicide. This further suggests that clinicians and HIV service providers should be especially attuned to this possibility and utilize screening mechanisms to assess for suicide risk when working with patients in these situations.

To date, the majority of studies assessing HIV-risk behaviors in minority populations with SMI have relied on data collected through self-reporting and one-time interviews [4, 6, 10, 16, 19, 25, 34, 40, 43, 45, 48, 50, 68, 81, 83, 84]. Cross-sectional designs and substantial reliance on univariate analyses have restricted the interpretation of results on correlates of HIV risk factors among adults with SMI [49]. Despite using valid and reliable instruments, errors may have been introduced due to potential complications from psychosis, medication side effects, or substance use and due to reliance on retrospective self-reported data to obtain sensitive personal information. In contrast, our reliance in this study on a mixed methods design permitted the collection and analysis of qualitative responses over time that augmented and helped to explain contradictory instrument responses. This method of triangulation improved the validity of research findings and helped to eliminate bias. Ethnographers established relationships with the participants and were able to elaborate on instrument responses with open-ended questions.

Several limitations must also be considered when interpreting study results including the focus on persons with SMI of one sex and ethnicity and a lower educational and socioeconomic status (SES). The selection of a sample of women with SMI may have attenuated the effects of demographic variables; for example, lower SES is known to increase risky sexual behavior in the general population. Since the data did not include a

non-SMI control group, the importance of SMI as a contributing factor to HIV risk could not be directly assessed.

The small sample size of Puerto Rican women in this study limited construction and evaluation of multivariate models and the large number of analyses performed may have increased the likelihood of a type I error. Collinearity among predictor variables restricted interpretation of Model 1. Further research should incorporate interaction terms or combine related variables to account for complex associations. The multivariate models were also limited in that the analysis involved presumably temporal relationships using cross-sectional data for poverty, employment history, and HIV-risk behavior with the possible overlap of lifetime substance abuse and psychiatric factors. Longitudinal designs that can establish temporality with respect to all predictors and outcomes should be employed in future research.

Clinical and public health implications

More research concerning specific aspects of mental illness and their association to HIV-risk behavior is needed. The importance of addressing a patient's sexual behavior within the context of psychiatric illness and other social factors has been highlighted by our findings and those of previous studies [49]. Adults with SMI are at high risk for HIV infection and are in need of targeted sexual risk reduction interventions that simultaneously address substance abuse prevention and treatment [49, 50, 68], childhood abuse, and the indirect effects associated with SMI such as living in poverty.

Mental health programs should address risk behavior among adults with SMI in the context of specific symptomatology and comorbidity with PTSD and axis II disorders. Integrating HIV prevention into ongoing mental health services has been shown to be cost effective [69]. Culturally appropriate, community-level interventions may also be necessary to create social norms supportive of HIV risk reduction [33]. Latinos are more likely than whites to receive a diagnosis later in the course of HIV infection which indicates that they may not be accessing health care services through which infection could be diagnosed at an earlier stage [14]. Interventions to prevent HIV that address multiple factors associated with risky sexual behaviors in the context of socioeconomic problems associated with poverty including limited access to high-quality health care must be further developed for Latinas [29] with SMI. In the context of the theoretical framework of this study, the continuous feedback between behavior, internal states, and the environment ensures that the social ecology exerts direct effects on behavior [31]. The women in this study could benefit from HIV interventions that endorse safer sex practices through partners and peers, reinforce safer practices, communicate behavioral expectations for safer sex, and provide condoms [31].

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Table 1
Demographic characteristics of severely mentally ill Puerto Rican women (N = 53)

Characteristic	Mean (SD)	Median (range) ^a	n (%)
Age at baseline	32.6 (8.7)		
GAF score		60 (30–80)	
Number of children		2 (1.0)	
Education (years)		11 (6–16)	
Diagnosis			
Depression			28 (52.8)
Bipolar			19 (35.9)
Schizophrenia			6 (11.3)
Age at baseline			
18–29			21 (39.6)
30–39			20 (37.7)
40–49			11 (20.8)
50+			1 (1.9)
Place of birth			
United States			12 (22.6)
Puerto Rico			40 (75.5)
Ecuador			1 (1.9)
Primary language			
English			7 (13.2)
Spanish			29 (54.7)
English and Spanish			17 (32.1)
Education			
Less than 12 years			28 (52.8)
Completed high school			11 (20.8)
More than 12 years			14 (26.4)
Marital status			
Never married			11 (20.8)
Married or living with partner			35 (66.0)
Divorced and separated			7 (13.2)
Number of children			
None			5 (9.4)
1–3			35 (66.0)
4–7			13 (24.5)
Employment status			
None			34 (64.2)
Part-time			9 (17.0)
Full-time			10 (18.9)
Primary source of income			
SSI or other public source			29 (54.7)

Characteristic	Mean (SD)	Median (range) ^a	n (%)
Employment			15 (28.3)
Partner or family income			9 (17.0)
Socioeconomic status			
Poverty ^b			46 (86.8)
Childhood abuse			
None			13 (24.5)
Sexual only			10 (18.9)
Physical only			4 (7.6)
Sexual and physical			26 (49.1)
Substance abuse			13 (24.5)

^aMedian (range) given for non-normally distributed variables

^bPoverty determined by looking at poverty line data for US in 2006

Table 2
Individuals classified as high risk by each of five criteria measured 6 months prior to baseline

Risk criterion	N (%)
Unprotected intercourse	28 (52.8)
Sex for drugs, gifts, or money (trade)	18 (34.0)
Sex with multiple partners	
2–5 partners	31 (58.5)
6–10 partners	4 (7.6)
11+ partners	2 (3.8)
Had intercourse while participant and/or partner was high on alcohol or other drugs	39 (75.0)
Injection drug using sexual partner	14 (26.9)

Table 3
Psychiatric profile of participants based on lifetime symptoms/risk factors experienced

Symptom/factor	<i>n</i> (%)
Hallucinations	
None	37 (70.0)
Visual	3 (5.7)
Auditory	10 (18.9)
Visual and auditory	3 (5.7)
Violent behavior	27 (50.9)
Attempted suicide	
Once	13 (24.5)
More than once	18 (34.0)
Number of psychiatric hospitalizations	
None	15 (28.3)
<5	30 (56.6)
5–10	5 (9.4)
>10	3 (5.7)
Global assessment of function (GAF) score	
45	6 (11.3)
46–60	22 (41.5)
61–70	16 (30.2)
71	9 (17.0)
Comorbid disorder	
Axis II disorder	2 (3.8)
Posttraumatic stress disorder (PTSD)	4 (7.6)
Suicidal ideation	46 (86.8)
Self-injurious behavior	9 (17.0)
Criminal/legal charges	14 (26.4)

Table 4
Bivariate associations between social and psychiatric variables and HIV-risk behaviors measured 6 months prior to baseline: odds ratio (95% confidence interval)

Variable	Multiple partners (n = 53)	Sex with IDU (n = 52)	Unprotected intercourse (n = 53)	Traded sex (n = 53)	Sex while high on drugs or alcohol (n = 52)
Demographics					
Age at baseline	0.99 (0.93–1.05)	1.00 (0.94–1.08)	0.97 (0.91–1.03)	0.99 (0.93–1.07)	0.98 (0.91–1.05)
Education (years)	0.91 (0.72–1.15)	1.03 (0.79–1.34)	1.00 (0.80–1.27)	1.03 (0.80–1.31)	0.83 (0.63–1.10)
Employed at baseline	0.95 (0.32–2.89)	1.44 (0.41–5.05)	0.71 (0.23–2.19)	3.61 (1.09–11.98) [*]	1.41 (0.37–5.39)
Poverty	2.25 (0.47–10.76)	2.44 (0.27–22.29)	3.25 (0.57–18.52)	3.52 (0.39–31.74)	11.56 (1.89–70.59) ^{**}
Social factors					
Abused substances ^a	1.13 (0.33–3.90)	3.32 (0.87–12.67) ⁺	0.70 (0.20–2.46)	3.08 (0.84–11.20) ⁺	2.16 (0.41–11.37)
Victim of childhood abuse	3.06 (0.87–10.80) ⁺	1.14 (0.26–5.00)	0.95 (0.27–3.32)	2.00 (0.47–8.44)	1.72 (0.42–7.06)
Romantic partner for 6 months	0.52 (0.16–1.65)	0.94 (0.26–3.37)	2.36 (0.74–7.55)	0.72 (0.22–2.36)	0.79 (0.21–3.05)
Psychiatric symptoms and factors					
GAF score ^b	0.98 (0.93–1.02)	0.92 (0.87–0.98) ^{**}	1.02 (0.98–1.07)	0.98 (0.94–1.03)	0.98 (0.92–1.03)
Suicidal thoughts ^b	1.31 (0.27–6.21)	2.44 (0.27–22.29)	0.15 (0.02–1.37) ⁺	0.65 (0.13–3.26)	2.63 (0.50–13.72)
Attempted suicide ^b	2.45 (0.81–7.46)	14.44 (1.71–121.64) ^{**}	1.21 (0.41–3.63)	1.68 (0.52–5.50)	3.20 (0.87–11.75) ⁺
Self-injurious behavior	1.28 (0.31–5.33)	0.74 (0.13–4.07)	1.14 (0.27–4.83)	0.50 (0.09–2.70)	1.20 (0.22–6.68)
Hallucinations ^b	2.31 (0.69–7.72)	13.33 (3.13–56.89) ^{**}	0.85 (0.26–2.75)	2.70 (0.80–9.14)	3.08 (0.60–15.92)
Comorbid axis II or PTSD disorder ^b	3.94 (0.68–22.96)	7.20 (1.15–45.16) [*]	1.92 (0.32–11.49)	4.71 (0.77–28.77) ⁺	0.63 (0.10–3.91)
Psychiatric hospitalization	1.38 (0.43–4.48)	1.49 (0.35–6.41)	0.67 (0.20–2.24)	1.04 (0.29–3.69)	0.76 (0.18–3.31)
Violent behavior ^b	2.16 (0.73–6.44)	2.00 (0.56–7.09)	0.68 (0.23–2.01)	3.90 (1.14–13.39) [*]	2.07 (0.57–7.48)
Criminal/legal charges ^b	2.25 (0.64–7.86)	2.81 (0.76–10.47)	1.27 (0.37–4.34)	6.00 (1.60–22.53) ^{**}	0.78 (0.20–3.08)
Psychiatric history profile (PHP)	1.03 (1.00–1.06) [*]	1.05 (1.02–1.09) ^{**}	0.99 (0.97–1.02)	1.04 (1.01–1.07) [*]	1.02 (0.99–1.05)

GAF global assessment of functioning, PTSD posttraumatic stress disorder

^aSubstances include alcohol and illegal drug use

^bSymptoms and factors contributing to psychiatric history profile (PHP) scale

⁺ *P* 0.10

$P < 0.05$
*
 $P < 0.01$
**

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Table 5
Linear regression analyses predicting number of HIV risk behaviors

Variable	Number of HIV risk behaviors			
	B (SE)	β	t	P
Model 1				
Psychiatric history profile ^a	0.02 (0.01)	0.29	1.77	0.08
Victim of childhood abuse	0.05 (0.49)	0.01	0.09	0.93
Abused substances	0.08 (0.53)	0.02	0.15	0.88
Lived in poverty	1.27 (0.60)	0.28	2.13	0.04
Employed at baseline	0.76 (0.42)	0.24	1.81	0.08
$R^2 = 0.04$, $P = 0.21$, Adj. $R^2 = 0.13$				
Model 2				
Psychiatric history profile	0.02 (0.01)	0.30	2.34	0.02
Lived in poverty	1.28 (0.58)	0.29	2.21	0.03
Employed at baseline	0.76 (0.41)	0.24	1.85	0.07
$R^2 = 0.01$, $P = 0.21$, Adj. $R^2 = 0.16$				
Model 3				
Psychiatric history profile	0.02 (0.01)	0.27	2.02	0.05
Lived in poverty	1.12 (0.59)	0.25	1.91	0.06
$R^2 = 0.02$, $P = 0.16$, Adj. $R^2 = 0.12$				

^aPsychiatric history profile (PHP) is a scale measuring psychiatric symptoms and risk factors that were significantly associated with sexual risk behaviors in bivariate analyses including: hallucinations, violent behavior, attempted suicide, GAF score, comorbid axis II or PTSD disorders, suicidal ideation, and criminal justice involvement