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Social support and mental health among adults prior to HIV counseling and testing in Durban, South Africa

Paul K Drain^{a,b,*}, Elena Losina^{b,c,d}, Sharon M Coleman^d, Laura Bogart^e, Janet Giddy^f, Douglas Ross^g, Jeffrey N Katz^c, and Ingrid V Bassett^{a,b}

^aDivision of Infectious Diseases, Massachusetts General Hospital, Boston, USA

^bMedical Practice Evaluation Center, Massachusetts General Hospital, Boston, USA

^cDepartment of Orthopedic Surgery, Brigham and Women's Hospital, Boston, USA

^dBoston University School of Public Health, Boston, USA

^eChildren's Hospital, Boston, USA

^fMcCord Hospital, Durban, South Africa

^gSt. Mary's Hospital, Durban, South Africa

Abstract

Poor social support and mental health may be important modifiable risk factors for HIV acquisition, but they have not been evaluated prior to HIV testing in South Africa. We sought to describe self-perceived mental health and social support and to characterize their independent correlates among adults who presented for voluntary HIV testing in Durban. We conducted a large cross-sectional study of adults (> 18 years of age) who presented for HIV counseling and testing between August 2010 and January 2013 in Durban, South Africa. We enrolled adults presenting for HIV testing and used the Medical Outcomes Study's Social Support Scale [0 (poor) to 100 (excellent)] and the Mental Health Inventory (MHI-3) to assess social support and mental health. We conducted independent univariate and multivariable linear regression models to determine the correlates of lower self-reported SSI and lower self-reported MCH scores. Among 4,874 adults surveyed prior to HIV testing, 1,887 (39%) tested HIV-positive. HIV-infected participants reported less social support (mean score 66 ± 22) and worse mental health (mean score 66 ± 16), compared to HIV-negative participants (74 ± 21 ; 70 ± 18) (p-values <0.0001). In a multivariable analysis, significant correlates of less social support included presenting for HIV testing at an urban hospital, not having been tested previously, not working outside the home, and being HIV-infected. In a separate multivariable analysis, significant correlates of poor mental health were similar, but also included HIV testing at an urban hospital and being in an intimate relationship less than 6 months. In this study, HIV-infected adults reported poorer social support and worse mental health than HIV-negative individuals. These findings suggest that interventions to improve

*Corresponding author. Medical Practice Evaluation Center; Massachusetts General Hospital; 50 Staniford St, 9th floor; Boston, MA 02114; USA; pdrain@partners.org.

Conflict of Interest Statement

We declare that we have no conflicts of interest.

poor social support and mental health should be focused on adults who do not work outside the home and those with no previous HIV testing.

Keywords

HIV/AIDS; social support; mental health; HIV testing; South Africa

Introduction

Sub-Saharan Africa has more than two-thirds of the global burden of the HIV/AIDS pandemic, and South Africa has more HIV-infected people than any other country (Joint United Nations Programme on HIV/AIDS [UNAIDS], 2011a, 2011b). While HIV care and treatment have expanded rapidly in sub-Saharan Africa (UNAIDS 2011a), the success of prevention efforts will rely on identifying HIV-infected people and promptly initiating eligible people on antiretroviral therapy (ART) (UNAIDS 2011a, South African Department of Health 2011). Delays in diagnosing HIV leads to advanced HIV disease, HIV-related opportunistic infections, and mortality (May et al., 2010; Castilla et al., 2002; Egger et al., 2002; Krentz et al., 2004; Sabin et al., 2004; Badri et al., 2006; Toure et al., 2008; Mills et al., 2011; Makoe et al., 2005).

Psychosocial factors, such as perceived social support and mental health, play an important role in care-seeking behavior, voluntary HIV testing, and HIV care in resource-limited settings. In southern Africa, depression and anxiety are common among people living with HIV/AIDS (Ickovics et al., 2001) and have been associated with faster disease progression and increased mortality (Ickovics et al., 2001 Antelman et al., 2007). We have previously shown both poor social support and mental health to be independently associated with late-stage HIV disease at initial HIV diagnosis (Drain et al., 2013). Greater social support has been associated with fewer depressive symptoms (Collins et al., 2006; McInerney et al., 2008), more frequent disclosure of HIV test results, and earlier diagnosis, better linkage, and more adherence to HIV care in South Africa (Kelly et al., 2014; Wouters et al., 2009). Although higher levels of social support were related to fewer HIV-related risk behaviors among female sex workers, people living with HIV/AIDS, and heterosexual adults (Qiao, Li, and Stanton, 2014), it has been unclear if HIV testing strategies should include people with poor social support and/or mental health in resource-limited settings (Lawn, Harries, Anglaret, Myer, & Wood, 2008; Ford et al., 2010). In addition, we wanted to understand if HIV-infected adults have poorer social support and worse mental health at the time of HIV counseling and testing, as compared to HIV-uninfected adults.

The theoretical framework of this manuscript related to characterizing psychosocial factors among people before testing for HIV may help direct HIV testing and linkage strategies for those with low social support or poor mental health. In sub-Saharan Africa, psychosocial factors have not been well characterized among adults prior to HIV testing, nor have they been compared between HIV-infected and -uninfected adults. Our a priori hypothesis was that HIV-infected people would have poorer social support and worse mental health at the time of HIV testing, as compared to HIV-negative individuals. We also sought to understand

the risk factors for poor social support and mental health in the population testing for HIV in Durban, South Africa. We performed a cross-sectional analysis of the baseline data from a large prospective randomized controlled trial to describe self-perceived mental health and social support, and to characterize their independent correlates, among adults who presented at a health center for voluntary HIV testing in Durban, South Africa.

Methods

Study sites and participants

We performed a cross-sectional analysis of the baseline data from a large prospective randomized controlled trial of adults (≥ 18 years of age) who presented for HIV counseling and testing between August 2010 and January 2013 in Durban, South Africa (Drain et al., 2013; Bassett et al., 2013). Enrollment and interviews were conducted before HIV testing in the outpatient clinical areas of McCord Hospital, St. Mary's Hospital, and two municipal health clinics. McCord Hospital is an urban, state-aided general hospital that serves the greater Durban area. St. Mary's Hospital in Mariannhill is a state-aided general hospital that serves a more resource-limited population in a peri-urban area of Durban. Both McCord Hospital and St. Mary's Hospital operated high-volume outpatient HIV clinics that began providing ART since 2001 and 2003, respectively, and received President's Emergency Plan for AIDS Relief (PEPFAR) support. The two municipal primary health clinics, Tshelimnyama and Mariannridge, are primary health care clinics located within the peri-urban catchment area of St. Mary's Hospital. Throughout the course of the study, all four clinical sites offered free HIV counseling and rapid testing during normal business hours.

We offered enrollment to adults awaiting HIV counseling and testing, but excluded those who were already known to be HIV-infected, pregnant, or unwilling to share their HIV test result with the research team. HIV testing, as well as participation in the study, carried no financial costs to the participant. All participants provided written informed consent either in English or Zulu. The ethics committees of McCord Hospital [IRB00005803] and St. Mary's Hospital in Durban, and Partners HealthCare in Boston [Protocol #: 2006-P-001379/40] approved the study.

Data collection

We surveyed participants about personal demographics, employment, health care utilization, and prior HIV testing. We asked 13 questions comprised of four social support scales (emotional/informational, tangible, positive interaction, affectionate) from the Medical Outcomes Study's Social Support Survey (MOS-SSS) on perceived personal social support (Sherbourne & Stewart, 1991). This scale has been used and validated as a social support survey tool among HIV-infected people in South Africa (Cronbach's $\alpha = 0.64$) (McInerney et al., 2008), as well as other resource-limited settings (Yu, Lee, & Woo, 2004; Mak et al., 2007; Li, Lee, THammawijaya, Jiraphongsa, & Rotheram-Borus, 2009). Each response was ranked on a 5-point Likert scale (1 being "none of the time" to 5 being "all of the time") and used to calculate a composite Social Support Index (SSI) score on a scale from 0 to 100. A low score represented poor self-perceived social support, and a high score represented good self-perceived social support. Overall, the SSI demonstrated excellent internal reliability

(Cronbach's $\alpha = 0.97$) in the Medical Outcomes Study (Sherborne & Stewart, 1991). We also asked 5 questions from the Mental Health Inventory (MHI-3) screening test about emotional health over the previous month (Veit, 1983). Each response was ranked on a 6-point Likert scale (1 being "all of the time" or "always" to 6 being "none of the time" or "never") and used to calculate a mental health composite (MHC) score. Similar to the SSI, the MHC ranged from 0 (poor mental health) to 100 (excellent mental health). We also asked participants about competing needs, i.e. if they had gone without food, clothing, or housing ("basic necessities") during the prior 6 months because they needed money for health care, or if they had foregone health care during the prior 6 months because they needed money for food, clothing, or housing (Cunningham et al., 1999).

After completing the survey, participants were offered HIV counseling and testing free of charge, and HIV-infected participants were offered free CD4 count testing. All HIV testing, care, and treatment were provided in accordance with current South African Department of Health HIV testing and treatment guidelines (South African Department of Health, 2011).

Statistical analyses

We used Fisher's Exact tests and t-tests to compare cohort characteristics, including SSI and MHC scores, between HIV-negative and HIV-infected individuals. We assessed the correlation between the SSI and MHC scores using Pearson correlation coefficients. Due to the high correlation between SSI and MHC scores, we conducted independent univariate and multivariable linear regression models to determine the correlates of lower self-reported SSI and lower self-reported MHC scores. To identify potential correlates of lower self-reported SSI and lower self-reported MHC scores a series of linear regression models were fit using an iterative model building approach. We first conducted unadjusted linear regression models for each independent variable. Factors with p-value <0.15 were then included together in a single multivariable model. Age and gender were forced into the models as important potential confounders. Factors that were no longer significant at the 0.15 level in the full multivariable model were removed one at a time. Finally, factors not selected based on the unadjusted analyses were included one at a time in the current multivariable model to assess their importance in adjusted analyses. Although we present data for both unstandardized and standardized coefficients, we discuss to mean differences of the unstandardized beta coefficients and 95% confidence intervals. To minimize collinearity, we assessed the correlation between all pairs of independent variables and verified that no pair of variables included in the same regression model was highly correlated (i.e., $r > 0.60$). We used t-tests to conduct comparisons of SSI between those with and without prior HIV testing, and stratified by HIV-status and CD4 category. All reported p-values were two-tailed, and a p-value <0.05 was considered statistically significant. We conducted analyses using SAS software (version 9.2; SAS Institute, Cary, NC).

Results

Cohort characteristics

Among 6,536 people screened for the study, 4,874 (75%) met eligibility criteria and were enrolled. Among those enrolled, mean age was 33.8 ± 12.6 years, 2,499 (51%) were male,

2,302 (47%) had completed high school, and 2,274 (47%) worked outside the home (Table 1). A minority (17%) were married, while 2,037 (50%) reported being in an intimate relationship for more than 6 months. Overall, 1,928 (40%) people had reported prior HIV testing, and 562 (12%) people reported at least one night in a hospital during the previous year.

In this cohort, 1,887 (39%) tested positive for HIV and 2,987 (61%) tested negative for HIV. Among the 1,670 (89% of HIV-infected) people who received CD4 count testing, the median CD4 count was 195 cells/mm³ (interquartile range 72–349 cells/mm³). All cohort characteristics, except gender, were significantly different between HIV-infected and HIV-negative participants. HIV-infected people were older, had less education, and were more often working outside the home. HIV-infected people lived further to a clinic, had a lower rate of previous HIV testing, were more likely to have been previously treated for tuberculosis, and more likely to have had an overnight hospital stay during the previous year. More specifically, one-quarter (N=465; 25%) of HIV-infected people reported previous HIV testing, while nearly one-half (N=1,463; 49%) of HIV-negative participants reported previous HIV testing. In addition, a significantly higher percentage of HIV-infected participants had ever foregone health care because they needed money for food, clothing, or housing (22%), as compared to HIV-negative participants (18%; $p<0.001$).

Social Support and Mental Health

Among the entire cohort, the mean social support index was 71.1 (± 21.4), and the mean mental health score was 68.3 (± 16.9) (Table 1). HIV-negative people reported a significantly greater social support, on average (74.1 ± 20.6), as compared to HIV-infected people (66.2 ± 21.9). Similarly, HIV-negative people had a statistically significantly better mental health score, on average (69.8 ± 17.5), as compared to HIV-infected people (65.8 ± 15.6). When stratified by category, each of the social support subscales was significantly higher among the HIV-negative participants as compared to the HIV-infected participants (Figure 1). The SSI and MHC scores were correlated with a Pearson $r = 0.61$ ($p<0.0001$).

Correlates of Mental Health

In univariate analyses, correlates of lower (or poorer) mental health were older age, not working outside the home, having more adults or children in the household, living more than 5 kilometers from the clinic, having foregone health care or food, clothing, or housing because of needing money, and being HIV-infected (Table 2). In addition, the mean difference in mental health score between those with no prior HIV testing and those previously tested for HIV was 9.21 ($p<0.001$), and between those tested at the peri-urban hospital and municipal clinics was 16.88 ($p<0.001$).

In a multivariable analysis, adjusted for age and gender, the mean difference in mental health score between those not working outside the home and those working outside the home was 6.24 (95% CI 5.35–7.13), and between those tested for HIV at the municipal clinics and those tested for HIV at the peri-urban hospital was 17.05 ($p<0.001$). In addition, participants with no previous HIV testing had a 5.62 (95% CI 4.71–6.53) lower average MHC score compared to those who had previous HIV testing. Those in an intimate

relationship less than 6 months had a 5.58 (95% CI 4.12–7.04) lower average MHC score compared to those participants not currently in an intimate relationship. Having more children in the household, traveling a distance to the clinic greater than 5 kilometers, and having foregone food, clothing or housing because of needing money for health care were each independently associated with a lower MHC score (p values <0.001). In the multivariable model, HIV-infected participants had a 1.54 (95% CI 0.65–2.42) lower MHC score as compared to HIV-negative participants.

Correlates of Social Support

In univariate analyses, correlates of a lower (or poorer) social support were older age, not working outside the home, being divorced/widowed, having fewer number of adults in the household, living more than 5 kilometers from the clinic, having foregone food, clothing, or housing because of needing money for health care, and being HIV-infected (Table 3). In addition, the strongest correlates of poorer social support in univariate analyses were no previous HIV testing (SSI difference 15.29; $p <0.001$) and being tested for HIV at the urban hospital (SSI difference 19.53; $p <0.001$).

In a multivariable analysis, adjusted for age and gender, participants not working outside the home had an 8.72 (95% CI 7.66–9.78) lower average SSI when compared to participants working outside the home ($p <0.001$). In the multivariable model, those divorced/widowed had a 6.26 (95% CI 3.73–8.78) lower average SSI when compared to those currently married ($p <0.001$). Having fewer adults and more children in the household were each independently associated with poorer social support (p values <0.001). Participants living >5 kilometers from the clinic (SSI difference 2.75; 95% CI 1.44–4.04), having had an overnight hospital stay during the previous year (SSI difference 2.41; 95% CI 0.82–3.99), and having foregone food, clothing or housing because of needing money for health care (SSI difference 7.32; 95% CI 5.04–9.61) were all associated with poorer social support. In the multivariable model, HIV-infected participants had a 2.40 (95% CI 1.34–3.46) lower SSI as compared to HIV-negative participants. The strongest correlates for low social support in adjusted analyses were having no previous HIV testing (SSI difference 9.23; 95% CI 8.15–10.31) and being tested for HIV at the urban hospital (SSI difference 18.81; 95% CI 17.13–20.49).

Social Support and Prior HIV testing

To further exam the relationship between social support and prior HIV testing, we summarized average social support score when stratified by HIV status and CD4 strata (Figure 2). Prior HIV testing was associated with better self-reported social support between HIV-negative and -infected participants, as compared to those without previous HIV testing. Among HIV-negative participants, the mean SSI score was 81.2 ± 17.1 among those with prior HIV testing and 67.3 ± 21.3 among those without prior HIV testing ($p <0.001$). Among HIV-infected participants, the mean SSI score was 77.2 ± 19.3 among those with prior HIV testing and 62.5 ± 21.6 among those without prior HIV testing ($p <0.001$). This difference remained statistically significant across all CD4 strata, with average SSI scores decreasing among lower CD4 count strata.

Discussion

In this large cohort in Durban, South Africa, we assessed psychosocial factors, including social support and mental health, prior to HIV testing among adults presenting at a health center for voluntary HIV testing. HIV-infected people were more likely to have poor self-reported social support and mental health scores compared to HIV-negative people. Poor social support and mental health scores were significantly related to each other, while correlates of both included not working outside the home and having no previous HIV testing. Average social support scores were also significantly lower among HIV-infected people with lower CD4 counts. These findings suggest that interventions to improve poor social support and mental health should be focused on adults who do not work outside the home and those with no previous HIV testing.

Few studies have assessed social support among HIV-infected people in sub-Saharan Africa, and no studies to our knowledge have assessed social support or mental health immediately prior to HIV testing. In a study of HIV-infected patients receiving ART at four hospitals in Durban, average social support (MOS score 64.4 ± 14.7) was similar to our study, and those with greater self-reported social support were more likely to have better physical functioning and improved ART adherence (Kelly et al., 2014; Ncama et al., 2008). Conversely, a study in 304 HIV-infected Ugandans did not find social support to have a correlation with ART adherence (Byakika-Tusiime et al., 2005). Among HIV-infected women in KwaZulu-Natal, South Africa, better social support was associated with condom use, support group attendance and taking vitamins, but not with increased disclosure of their HIV status (Gaede et al., 2006). This study also found that women in rural areas reported higher social support than women in urban areas, which was similar to our findings. In a small qualitative study in South Africa, eleven HIV-infected women considered social support to be a valuable asset (Aspeling & van Wyk, 2008). Among HIV-infected patients in China and Thailand, good social support has been associated with overall psychological well-being and inversely correlated with depression and perceived stigma (Yu et al., 2004; Mak et al., 2007; Li et al., 2009). To our knowledge, our study is the first to assess social support prior to HIV testing, which helps to eliminate confounding by HIV status, in sub-Saharan Africa, and suggests that social support issues may precede HIV diagnosis.

Several tools have been used to assess domains of mental health among HIV-infected adults (Revicki, Sorenson, Wu, 1998; Homes, 1998; Cook et al., 2006), but studies at initial HIV diagnosis in sub-Saharan Africa are limited. We have previously described depressive symptoms to be common (55%) among newly-diagnosed HIV-infected participants and associated with lower likelihood of receipt of CD4 count results (Ramirez-Avila et al., 2012). In our analyses, we found that poorer mental health was more common among HIV-infected adults and was associated with poorer self-reported social support. A study of 242 pregnant women found depression was not associated with HIV status in a more rural area of KwaZulu-Natal (Rochat et al., 2006). However, a study of 164 people seeking HIV testing in India, found HIV-infected adults were more anxious and depressed when using a modified version of the Patient Health Questionnaire (PHQ-9) (Mayston et al., 2013) or Hospital Anxiety and Depression Scale (Sahay et al., 2007). Our study builds on previous

studies by including a larger samples size and examining more correlates for low social support and poor mental health before HIV testing.

In our study, HIV-infected adults reported poorer social support and worse mental health than HIV-negative individuals. The most significant independent correlates for both lower social support and mental health were not working outside the home and having no prior HIV testing. Given the cross-sectional design of our study, we are unable to determine if better social support would lead to more HIV testing, or the role of targeting HIV testing for people with poor mental health and low social support. A study in Mozambique found that perceived social support decreased significantly from ART initiation (mean 61.7) to one year later (55.3) (Pearson et al., 2009). Our study was also limited by using single measures for social support and mental health score, but these instruments both have evidence for validity and reliability when used for screening in HIV-infected populations (Holmes, Bix, & Shea, 1996; Wu, Hays, Kelly, Malitz, & Bozzette, 1997; Bova, Jaffarian, Hilman, Mangini, & Ogawa, 2008). Fewer adults and more children were each associated with poor social support, which may reflect the stress of child-rearing in these communities. We also did not assess stigma and fear of HIV testing, which may be additional factors associated with HIV testing behaviors. Our findings pertain to adults who presented to a health center for HIV testing, and may not be reflective of the general population. The primary strengths of our study were the large sample size and the assessment of self-reported social support and mental health just prior to HIV testing.

In conclusion, poorer social support and mental health appear to be correlated at HIV testing, and share similar independent correlates. Our results highlight the importance of HIV testing for people with low social support or poor mental health, as well as the complex relationship between self-reported social support and mental health score, previous testing for HIV, and being HIV-infected in South Africa. To identify more HIV-infected adults, screening programs should target those with poor self-perceived social support and/or mental health by reaching those who do not work outside the home and have no previous HIV testing. Promoting mental health and social support services could be beneficial among HIV-infected adults in resource-limited settings.

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Figure 1. Mean scores for mental health, social support, and sub-scales of social support by HIV status in Durban (N=4,874).*

* Error bars represent 95% confidence intervals of the mean.

Figure 2. Social Support Index scores among those who did and did not report prior HIV testing by HIV status and CD4 strata (N=4,874).*

* Error bars represent 95% confidence intervals of the mean.

Table 1

Cohort characteristics by HIV status (N=4,874).

	Total (N=4,874)	HIV-infected (N=1,887)	HIV-negative (N=2,987)	p-value
Age (yrs)	33.8 ±12.6	34.9 ±10.3	33.0 ±13.8	<0.0001
Gender				0.62
Male	2,499 (51.3%)	959 (50.8%)	1,540 (51.6%)	
Female	2,375 (48.7%)	928 (49.2%)	1,447 (48.4%)	
Education				<0.0001
Completed high school	2,302 (47.2%)	774 (41.0%)	1,528 (51.2%)	
Did not complete high school	2,571 (52.8%)	1,112 (59.0%)	1,459 (48.8%)	
Employment				<0.0001
Working outside the home	2,274 (46.7%)	1,020 (54.1%)	1,254 (42.0%)	
Not working outside the home	2,600 (53.3%)	867 (45.9%)	1,733 (58.0%)	
Marital status				0.0002
Never married	3,813 (78.2%)	1,537 (81.5%)	2,276 (76.2%)	
Currently married	817 (16.8%)	265 (14.0%)	552 (18.5%)	
Divorced/widowed	244 (5.0%)	85 (4.5%)	159 (5.3%)	
Current Intimate Relationship				<0.0001
No	1,482 (36.5%)	506 (31.2%)	976 (40.1%)	
Yes, <6 months	538 (13.3%)	160 (9.9%)	378 (15.5%)	
Yes, >6 months	2,037 (50.2%)	956 (58.9%)	1,081 (44.4%)	
Household				
Number of adults in household	2.5 ±1.7	2.4 ±1.7	2.6 ±1.7	<0.0001
Number of children in household	1.6 ±1.7	1.5 ±1.6	1.7 ±1.8	<0.0001
Health Care Proximity				<0.0001
Distance to clinic 5 kilometers	3,649 (74.9%)	1,533 (81.2%)	2,116 (70.8%)	
Distance to clinic <5 kilometers	1,225 (25.1%)	354 (18.8%)	871 (29.2%)	

	Total (N=4,874)	HIV-infected (N=1,887)	HIV-negative (N=2,987)	p-value
Previous HIV Testing				<0.0001
Prior HIV testing	1,928 (39.6%)	465 (24.7%)	1,463 (49.0%)	
No prior HIV testing	2,944 (60.4%)	1,420 (75.3%)	1,524 (51.0%)	
Previous TB Treatment				<0.0001
Prior TB treatment	383 (7.9%)	199 (10.5%)	184 (6.2%)	
No prior TB treatment or don't know	4,491 (92.1%)	1,688 (89.5%)	2,803 (93.8%)	
Hospitalization during previous year				0.001
Overnight hospital stay	562 (11.5%)	253 (13.4%)	309 (10.3%)	
No overnight hospital stay	4,312 (88.5%)	1,634 (86.6%)	2,678 (89.7%)	
Competing Needs to Health Care				
Have foregone health care because needed money for food, clothing, or housing	954 (19.6%)	415 (22.0%)	539 (18.0%)	0.0007
Have not foregone health care because needed money for food, clothing, or housing	3,920 (80.4%)	1,472 (78.0%)	2,448 (82.0%)	
Have foregone food, clothing, or housing because needed money for health care	747 (15.3%)	324 (17.2%)	423 (14.2%)	0.005
Have not foregone food, clothing, or housing because needed money for health care	4,127 (84.7%)	1,563 (82.8%)	2,564 (85.8%)	
Mental Health and Social Support				
Mental Health Score	68.3 ±16.9	65.8 ±15.6	69.8 ±17.5	<0.0001
Social Support Index	71.1 ±21.4	66.2 ±21.9	74.1 ±20.6	<0.0001
Study Site				<0.0001
McCord Hospital	1,534 (31.5%)	783 (41.5%)	751 (25.2%)	
St. Mary's Hospital	2,183 (44.8%)	762 (40.4%)	1,421 (47.6%)	
Municipal clinics	1,154 (23.7%)	340 (18.0%)	814 (27.3%)	

Table 2

Univariate and multivariable correlates of low (poor) Mental Health Composite score (N=4,874).

	Univariate Linear Regression		Multivariable Linear Regression *		
	β (95% CI) *	p-value	β (95% CI) *	Std β	p-value
Demographic					
Age	0.07 (0.03, 0.11)	<0.001	0.01 (-0.03, 0.05)	0.01	0.52
Male sex	-3.25 (-4.19, -2.31)	<0.001	-1.06 (-1.92, -0.19)	-0.03	0.02
Education and Employment					
Did <u>not</u> complete high school	0.09 (-0.86, 1.04)	0.85	--		n/a
<u>Not</u> working outside the home	5.27 (4.33, 6.21)	<0.001	6.24 (5.35, 7.13)	0.19	<0.001
Marital Status					
Never married	-1.78 (-3.97, 0.41)	0.26	--		n/a
Currently married	-1.44 (-3.85, 0.98)				
Divorced/widowed	Ref.				
Current Intimate Relationship					
No	Ref.	<0.001	Ref.		<0.001
Yes, <6 months	1.04 (-0.60, 2.67)		5.58 (4.12, 7.04)	0.11	
Yes, >6 months	-4.69 (-5.80, -3.58)		-1.21 (-2.30, -0.11)	-0.04	
Household					
Number of adults in household	0.70 (0.42, 0.97)	<0.001	-0.36 (-0.63, -0.08)	-0.04	0.01
Number of children in household	0.71 (.043, 0.99)	<0.001	0.61 (0.32, 0.90)	0.06	<0.001
Health Care					
Distance to clinic >5 km	2.23 (1.14, 3.33)	<0.001	2.97 (1.89, 4.04)	0.08	<0.001
<u>No</u> Previous HIV testing	9.21 (8.27, 10.14)	<0.001	5.62 (4.71, 6.53)	0.16	<0.001
Previous TB treatment	0.39 (-1.37, 2.15)	0.66	1.37 (-0.17, 2.90)	0.02	0.08
Overnight hospital stay during previous year	-2.40 (-3.89, -0.92)	0.002	1.07 (-0.24, 2.38)	0.02	0.11
Competing Needs to Health Care					
Have foregone health care because needed money for food, clothing, or housing	4.93 (3.74, 6.12)	<0.001	--		n/a

	Univariate Linear Regression		Multivariable Linear Regression*		
	β (95% CI)*	p-value	β (95% CI)*	Std β	p-value
Have foregone food, clothing, or housing because needed money for health care	6.51 (5.20, 7.81)	<0.001	2.40 (1.23, 3.58)	0.05	<0.001
HIV Status					
HIV-infected	3.97 (3.00, 4.93)	<0.001	1.54 (0.65, 2.42)	0.04	<0.001
Site					
Urban Hospital	1.60 (0.50, 2.70)	<0.001	2.24 (0.74, 3.74)	0.06	<0.001
Peri-urban Hospital	-16.88 (-17.91, -15.85)		-17.05 (-18.31, -15.79)	-0.51	
Municipal Clinics	Ref.		Ref.		

CI – confidence interval. **Std** = **Standardized β** .

* A positive correlation coefficient is associated with a low Mental Health Composite score, which indicates poor mental health. Multivariable regression model $R^2 = 0.39$, $p < 0.001$.

Table 3

Univariate and multivariable correlates of low (poor) Social Support Index (N=4,874).

	Univariate Linear Regression		Multivariable Linear Regression *		
	β (95% CI) *	p-value	β (95% CI) *	Std β	p-value
Demographic					
Age	0.19 (0.14, 0.23)	<0.001	0.01 (-0.04, 0.06)	0.01	0.59
Male sex	-0.47 (-1.68, 0.73)	0.44	0.78 (-0.25, 1.81)	0.02	0.14
Education and Employment					
Did <u>not</u> complete high school	0.83 (-0.37, 2.04)	0.18	--		n/a
<u>Not</u> working outside the home	4.46 (3.26, 5.66)	<0.001	8.72 (7.66, 9.78)	0.20	<0.001
Marital Status					
Never married	-6.80 (-9.57, -4.03)	<0.001	-0.92 (-3.46, 1.62)	-0.02	<0.001
Currently married	-7.57 (-10.62, -4.51)		-6.26 (-8.78, -3.73)	-0.11	
Divorced/widowed	Ref.		Ref.		
Household					
Number of adults in household	-0.56 (-0.91, -0.21)	0.002	-1.47 (-1.79, -1.14)	-0.12	<0.001
Number of children in household	-0.29 (-0.64, 0.07)	0.11	0.81 (0.47, 1.15)	0.06	<0.001
Health Care					
Distance to clinic >5 km	10.15 (8.79, 11.50)	<0.001	2.75 (1.44, 4.07)	0.06	<0.001
<u>No</u> Previous HIV testing	15.29 (14.13, 16.44)	<0.001	9.23 (8.15, 10.31)	0.21	<0.001
Previous TB treatment	0.79 (-1.45, 3.03)	0.49	--		n/a
Overnight hospital stay during previous year	0.20 (-1.68, 2.09)	0.83	2.41 (0.82, 3.99)	0.04	0.003
Competing Needs to Health Care					
Have foregone health care because needed money for food, clothing, or housing	0.02 (-1.49, 1.54)	0.98	-3.86 (-1.73, -6.00)	-0.07	<0.001
Have foregone food, clothing, or housing because needed money for health care	4.37 (2.70, 6.04)	<0.001	7.32 (5.04, 9.61)	0.12	<0.001
HIV Serostatus					
HIV -infected	7.85 (6.63, 9.06)	<0.001	2.40 (1.34, 3.46)	0.05	<0.001
Site		<0.001			<0.001

	Univariate Linear Regression			Multivariable Linear Regression *		
	β	(95% CI)	p-value	β	(95% CI)	p-value
Urban Hospital	19.53	(18.08, 20.97)		18.81	(17.13, 20.49)	0.41
Peri-urban Hospital	-2.95	(-4.30, 1.59)		-4.36	(-5.80, -2.91)	-0.10
Municipal Clinics		Ref.			Ref.	

CI – confidence interval. **Std =Standardized β .**

* A positive correlation coefficient is associated with a low Social Support Index score, which indicates poor social support. Multivariable regression model $R^2 = 0.35$, $p < 0.001$.