

Monteiro, F., Canavarro, M. C., & Pereira, M. (2017). Prevalence and correlates of psychological distress among middle-aged and older women living with HIV. *Psychology, Health & Medicine*, 22(9), 1105-1117. doi:10.1080/13548506.2017.1281972

## **Prevalence and correlates of psychological distress of middle-aged and older women living with HIV**

### **Abstract**

The aims of this study were to examine the prevalence and correlates of psychological distress among older women living with HIV in comparison to their male counterparts and younger women and to identify the sociodemographic and disease-related factors associated with psychological distress. The sample consisted of 508 HIV-infected patients (65 older women, 323 women aged below 50 years, and 120 older men) recruited from 10 Portuguese hospitals. Data regarding psychological distress were collected using the Brief Symptom Inventory (BSI). Seven older women (10.8%), eight older men (6.7%), and 61 younger women (18.9%) reported a T-score  $\geq 63$  for global severity index (GSI), indicative of a need for further psychological evaluation. Overall, younger women reported significantly higher psychological distress than older men. The odds of having clinically significant psychological distress score were significantly lower for older women reporting sexual transmission, while for younger women, having other co-infections was a significant correlate of higher psychological distress. Younger women were 2.67 (95% CI: 1.22-5.84) times more likely to report psychological distress than were older men. The odds were not significantly different from older women. This study shows that older women do not differ substantially from younger women and older men in terms of psychological distress. The results reinforce, however, that mental health interventions should be tailored to reflect individuals' circumstances as well as developmental contexts. Moreover, they draw attention to the importance of examining resilience characteristics in older adults to understand the mechanisms behind "successful ageing" while living with HIV.

**Keywords:** Psychological distress; HIV/AIDS; Middle-aged and older adults; Women.

## **Introduction**

HIV infection is increasingly affecting adults over the age of 50 years worldwide. Although the HIV epidemic affects all people, its impact on women, and particularly on middle-aged and older (hereafter older for short) women, is often overlooked. A deeper understanding of this group is extremely important, as older women may experience numerous psychosocial and psychological burdens, such as caregiving issues and household responsibilities that may inhibit self-care, financial burdens and employment-related stress, loneliness and lack of social support (for a review, see Durvasula, 2014), which may increase their vulnerability and accordingly contribute to further impairments in their well-being and mental health.

The interest on mental health of people living with HIV/AIDS (PLWHA) has been evidenced in the literature since the beginning of the AIDS epidemic (Chuang, Jason, Pajurkova, & Gill, 1992; Collins, Holman, Freeman, & Patel, 2006). However, most mental health research in HIV has relied largely on samples of younger individuals, with an overrepresentation of men. Consequently, little is known about the mental health needs and the psychological distress of older PLWHA, particularly of older women. Older women with HIV are often stigmatized because of myths about ageing or sexuality (Vanable, Carey, Blair, & Littlewood, 2006) and have the added burden of being a caregiver while living with a chronic medical condition (Hackl, Somlai, Kelly, & Kalichman, 1997). These aspects may compound the risk for mental health problems (Major & O'Brien, 2005), as these experiences may serve as additional stressors and contribute to increased difficulties in psychological adjustment (Heckman et al., 2004).

In the general older population, female gender is often portrayed a risk factor for the development of symptoms of psychological distress, particularly depressive and anxiety symptoms (Vink, Aartsen & Schoevers, 2008). Research has also indicated that psychological distress is more prevalent among HIV-infected women, when compared to men (Gordillo et al., 2009; Robertson et al., 2014) or to uninfected women (Morrison et al., 2002). Regarding age differences, past research has shown evidence of decreased mental health among older HIV patients (Groves, Golub, Parsons, Brennan, & Karpiak, 2010; Heckman et al., 2002). Despite these findings, a recent literature review suggested that mental health outcomes are less age-dependent (Degroote, Vogelaers, & Vandijck,

2014). Among older women with HIV, to our knowledge, there has been limited research specifically addressing the prevalence of psychological distress. Given this dearth of research, further studies are noticeably needed.

Besides the importance of assessing the prevalence of psychological distress among older adults, identifying its sociodemographic and disease-related correlates is also critical to improving their psychological well-being. In this context, existing studies have reported mixed findings. However, there has been some consistency showing an association between better mental health and having a stable partner (Protopopescu et al., 2007), having higher education (Benoit et al., 2014; Murri et al., 2003) and having employment (Blalock, McDaniel, & Farber, 2002; Rueda et al., 2011). Regarding HIV-related variables, lower CD4+ T-cell counts were associated with decreased mental health (Armon & Lichtenstein, 2012; Protopopescu et al., 2007), a longer time since HIV diagnosis was associated with both poorer (Zinkernagel et al., 2001) and better mental health (Rueda et al., 2011), and disruption of anti-retroviral therapy was associated with poorer mental health outcomes (Liu et al., 2006). These findings have been reported across multiple samples, most notably among younger PLWHA. Therefore, it is possible that these variables may contribute differently to the psychological distress of older women, a focus that, to our knowledge, has not been the subject of any research.

In this study, the objective was to examine the prevalence and correlates of psychological distress among older women with HIV, compared to their male counterparts and to women less than 50 years. Although the age of 50 is not generally used to identify “elderly” patients, this cut-off is often used in the context of HIV by the Centers for Disease Control and Prevention (CDC) and is recommended to define advanced age in HIV infection (Blanco et al., 2012). A secondary objective was to identify the sociodemographic and disease-related factors associated with psychological distress within these groups.

## **Methods**

### **Participants and procedure**

Participants of this study were invited to participate while attending a consultation with their infectious disease specialist. The recruitment procedures have been described with more detail

elsewhere (Pereira & Canavarro, 2011). A total of 1,251 patients attending the main departments of infectious diseases of 10 Portuguese hospitals were consecutively recruited by convenience.

Participants who did not complete the set of questionnaires ( $n = 54$ ) or did not report their age ( $n = 2$ ) were excluded. One participant was excluded because (s)he self-identified as transgender. Given the aim of this study, 686 participants (men < 50 years) were also excluded. The final sample comprised 508 HIV-infected patients: 65 older women (12.8%), 323 women aged below 50 years (63.6%) and 120 older men (23.6%).

After a detailed explanation of the study objectives, written informed consent was obtained from all participants. Ethical approval was obtained from the Ethics Committee of all the institutions involved. Participants received no compensation for their participation.

### **Measures**

Sociodemographic (e.g., age, education, ethnicity) and HIV-related (e.g., HIV stage, CD4+ T-cell count, year of HIV diagnosis) data were collected by self-report and confirmed from the participants' medical records.

Psychological distress was assessed with the 53-item Brief Symptom Inventory (BSI; Derogatis, 1993). Respondents were asked to rate each symptom on a 5-point scale, ranging from 0 (*Never*) to 4 (*Very often*). The BSI assesses nine symptom dimensions and three global indices. In this study, being a summary index of psychological distress, the Global Severity Index (GSI) was used. Raw scores were converted to T-scores with a mean value of 50 and a standard deviation (*SD*) of 10. According to Derogatis, participants with subscale (dimensions) or GSI T-scores  $\geq 63$  were defined as having clinically significant psychological distress. A dummy variable was created to categorize individuals into one group if they had a T-score < 63 and into a second group if they had a T-score  $\geq 63$  ("caseness" - an indicator of the need for further psychological evaluation). The Cronbach's alphas in this study were all above .72, with the exception of paranoid ideation ( $\alpha = .67$  for older women).

### **Data analysis**

Data were analysed using the Statistical Package for Social Sciences (IBM SPSS 22.0). Chi-square analyses were used to assess whether the study groups had different proportions of people above the threshold of the BSI (T-score  $\geq 63$ ) for being considered "caseness". Univariate

(ANCOVA) and multivariate analysis of covariance (MANCOVA) were used to test for group differences in the GSI and symptoms of psychological distress, respectively. Bonferroni adjustments were applied to correct for multiple comparisons ( $p < .01$ ). Multiple logistic regression analyses were used to identify factors associated with psychological distress.

## **Results**

### **Participant characteristics**

The sociodemographic and HIV-related characteristics are displayed in Table 1. Overall, older women had less years of education, were more likely to be widowed and to be diagnosed with HIV for a shorter time. Additionally, they were less likely to be single and to report HIV transmission through intravenous drug use (IDU). No significant differences were found regarding employment status, ethnicity, HIV stage, CD4+ T-cell count, combination anti-retroviral therapy (cART) or the presence of other co-infections.

[Table\_1\_about\_here]

### **Psychological distress**

Results of the MANCOVA comparing the study groups on the nine psychological symptoms indicated a significant multivariate effect (Wilks'  $\lambda = .93$ ,  $F(18, 952) = 1.83$ ,  $p = .018$ ,  $\eta_p^2 = .03$ ). Follow-up tests (after Bonferroni correction) indicated differences in three dimensions, with younger women reporting significantly higher scores than older men in interpersonal sensitivity, hostility and paranoid ideation. No significant differences were found between younger and older women or between older women and men (Table 2).

[Table\_2\_about\_here]

### **Cases and non-cases prevalence**

There were significant differences in the proportion of individuals that scored above the criteria for caseness (Table 3). Compared to older men, a greater proportion of younger women met caseness for interpersonal sensitivity, hostility and paranoid ideation. No significant differences were found between older women and the comparison groups.

[Table\_3\_about\_here]

### **Correlates of psychological distress**

In the univariate model (Table 4), for older women, the odds of having a clinically significant GSI score were significantly lower for older women reporting sexual transmission (Odds ratio [OR] = 0.15, 95% Confidence Interval [CI]: 0.03-0.86). Among younger women, the only significant correlate of increased psychological distress was having other co-infections. Regarding older men, none of the variables were significantly associated with increased likelihood of psychological distress.

[Table\_4\_about\_here]

For older women, the multivariate logistic regression showed that none of the variables were associated with a GSI T-score  $\geq 63$ . Among younger women, the only factor independently associated with a higher likelihood of psychological distress was the presence of other co-infections. Because in the male group only one variable was associated with a GSI T-score  $\geq 63$  for  $p < .20$ , the multivariate model was not computed.

These analyses were also conducted in the total sample, adding the study groups as an independent variable. The univariate model (Table 5) indicated that compared to older men, younger women were 3.26 times more likely to report psychological distress (95% CI: 1.51-7.04). In the multivariate model, only the age-group was an independent correlate of psychological distress. Reinforcing the univariate results, younger women were almost 3 times more likely to report with a GSI T-score  $\geq 63$ , compared to older men.

[Table\_5\_about\_here]

## **Discussion**

This study examined the prevalence and correlates of psychological distress among older women with HIV, compared to their male counterparts and to women less than 50 years old. The results indicated greater psychological distress among younger women when compared to older men (the odds of being assessed with clinically psychological distress was 1.22 to 5.84 times higher among younger women). A possible explanation may be the myriad of psychosocial stressors observed in HIV-infected women, such as financial and housing problems, caregiving tasks, relationship problems or even abandonment (Durvasula, 2014; Gurung, Kemeny, & Myers, 2004), which may not affect so prominently their male counterparts. An alternate explanation may be the unique biological aspects that HIV-infected women face, such as health changes due to menopause or early transition to

menopause (Andany, Kennedy, Aden, & Loutfy, 2016; Tariq, Delpech, & Anderson, 2016), which have been associated with a significant prevalence of psychological symptoms (Ferreira et al., 2007; Maki et al., 2012). All these factors may serve as additional stressors, and coping with these cumulative effects may be psychologically demanding for most women living with HIV.

These findings may also reflect a possible “successful ageing”, which has been recently highlighted in several studies (Emlet, Tozay, & Raveis, 2011; Fang et al., 2015; Moore et al., 2013). Despite HIV and age-related consequences, there is evidence showing that older adults seem to demonstrate strengths and even decreased symptoms of depression and anxiety when compared to younger adults (McGowan et al., 2016). In our study, gender seems to play a more salient role in the prevalence of psychological distress. Besides the differences that were found between younger women and older men, there was also a trend indicating that older women reported higher scores than older men in all psychological symptoms, although the results did not achieve statistical significance. Hence, there is no doubt that mental health issues are an essential topic, as this segment of the population is likely to be most prevalent in the years to come. Accordingly, because women, compared to their male counterparts, face many unique challenges that greatly influences well-being, developing mental health interventions appropriate for age and also reflecting women’s and men’s distinctive vulnerabilities are of major relevance.

Fifteen percent of the sample reported psychological distress beyond the threshold considered clinically significant for the BSI. This value is similar to those reported by other studies in which the same measure has been used (Basta, Shacham, & Reece, 2009; Shacham, Basta, & Reece, 2008). These results are lower than those reported by Benoit et al. (2014), although the fact that a different measure was used (Kessler Psychological Distress Scale) may account for this difference. These results are consistent with prior studies indicating that psychological distress was more prevalent among HIV-infected women when compared to men (Gordillo et al., 2009; Robertson et al., 2014). In part, our findings also support those found in the general population, indicating that young people experience a higher prevalence of psychological distress, compared to older groups, regardless of the presence of chronic medical conditions, sociodemographic, and other health-related variables (Chittleborough, Winefield, Gill, Koster, & Taylor, 2011).

Regarding the psychological symptoms, younger women reported significantly higher scores on interpersonal sensitivity, hostility and paranoid ideation than older men. These results suggest that younger women seem to be harbouring more anger/hostility behaviours towards others, either because of lack of interpersonal skills, as a protective measure to buffer the psychological impact of HIV-related stigma and discrimination or as an expression of the mode of transmission. In this sample, a further analysis suggested a trend for younger women reporting IDU having higher scores on hostility than older men (Mean: 54.22 vs. 45.77) as well as men and women reporting other modes of transmission. This result is in line with prior evidence suggesting that substance abusers experience more anger than nonusers (DeMoja & Spielberger, 1997). Cumulatively, these behaviours can therefore induce an environment where important sources of support may not be received. Though anger/hostility has been recently associated with younger age in HIV-infected patients (McIntosh et al., 2015), the synergistic role of age, gender and mode of HIV transmission warrants further exploration. Nevertheless, because such psychological dimensions may have detrimental effects on individuals' interpersonal functioning, interventions that taught interpersonal skills, such as assertiveness training and anger management (Antoni, 2003), may be of value for younger women.

The mode of transmission was a significant correlate of psychological distress among older women, with those reporting transmission through IDU being more likely to report clinically significant psychological distress. Recently, among HIV-infected women of all ages, Benoit et al. (2014) found that not reporting IDU in the last six months was associated with decreased psychological distress, which is partially consistent with our results. A possible explanation may be the previous history of drug and substance, which has been associated with poorer mental health in HIV-infected patients (Degroote et al., 2013; Korhuis et al., 2008), including in all-female samples (te Vaarwerk & Gaal, 2001). Because we do not have data regarding current drug use, future studies are warranted to better understand this association.

Among younger women, the presence of other co-infections (in this study, 44 out of 60 women with co-infections had hepatitis C virus [HCV]) was associated with higher odds of psychological distress. This is noteworthy as there has been evidence of a positive association between psychological distress and the presence of HIV in combination with other infections, and

particularly hepatitis C (Pereira, Fialho, & Canavarro, 2014). However, because research in the area of co-infections has focused on mixed (predominantly male) or exclusively male samples, additional studies specifically focusing on women are needed. This is particularly relevant for younger women, as most are of reproductive age (in this study, 73.3% were below 40 years) and, for example, it has been shown that HIV/HCV co-infected mothers have significantly increased likelihood of vertical HCV transmission than do women with HCV alone (Polis, Shah, Johnson, & Gupta, 2007).

This study is not without limitations. The cross-sectional design, which precludes any causal associations, and the convenience sample require caution in interpreting and generalizing these findings. Psychological distress was assessed with the BSI, a self-reported screening tool that has been frequently used in HIV research (Basta et al., 2009; Brown et al., 2015). Although the BSI is a well-known and reliable index of psychological distress and assesses a wide range of psychological symptoms, the validity of its factorial structure has been questioned (Loutsiou-Ladd, Panayiotou, & Kokkinos, 2008). Thus, a cautious approach in interpreting the subscale profile scores is important. Other variables that were not collected, such as financial burden, close relationships and social support, resilience characteristics, coping skills and stigma (related to both HIV and age) could add significant inputs for our findings. The assessment of these variables may be pertinent to clarify the factors and/or mechanisms underlying the concept of “successful ageing”. In this context, studies comparing older PLWHA and older individuals without HIV would also be valuable. Because menopause is also an important part of ageing and that women with HIV are at higher risk of developing early and premature menopause (Andany et al., 2016), in future studies it would be also relevant the comparison of mental health outcomes considering the age of menopause onset. Although the overall sample was of a reasonable size, there is considerable heterogeneity in sample size across the three groups, and the number of women aged 50 years and older was much smaller than the group of younger women. Finally, the sample comprised a relevant proportion of middle-aged patients rather than the elderly (adults aged 65 years and older, as conventionally defined by the World Health Organization – in this study, only 15.1% of patients were above 65 years). Therefore, these results must be viewed as preliminary and in need of replication and extension.

Despite these limitations, this study has important strengths. This study shows that psychological distress in PLWHA includes not only depression and anxiety but also a wide range of psychopathological symptoms that should be contemplated when considering mental health in HIV. Most importantly, these findings contribute to the scarce literature on the mental health of middle-aged and older women with HIV, being, to our knowledge, the first study examining the prevalence and correlates of psychological distress in this group of the HIV population.

In conclusion, as the prevalence of older PLWHA is expected to increase, addressing their mental health needs and recognizing the diversity of individual circumstances and developmental contexts are increasingly needed. In this regard, the training of age-specialized mental health providers is of major relevance, and new treatment paradigms (encompassing a comprehensive and integrated care) are needed to cope with this emergent population (Justice, 2010). Finally, as psychological distress was not highest among the older age-groups, our findings also draw attention to the importance of examining resilience characteristics of older adults to understand the mechanisms behind successful ageing while living with HIV. Importantly, a greater attention to younger women is also needed to prevent further impairments in physical and mental health.

### **Disclosure Statement**

The authors declare that they have no conflict of interest.

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Table 1  
Sociodemographic and HIV-related characteristics of the study groups

	Women $\geq$ 50 years (n = 65)	Women < 50 years (n = 323)	Men $\geq$ 50 years (n = 120)	F/ $\chi^2$	$\eta_p^2$ / Cramer's V
Age (years)	57.58 $\pm$ 6.07	36.56 $\pm$ 6.73	57.98 $\pm$ 7.17		
Education (years)	5.83 $\pm$ 3.56	8.32 $\pm$ 3.99	7.34 $\pm$ 4.98	10.35***	.04
Time since HIV diagnosis (years)	5.52 $\pm$ 4.87	7.85 $\pm$ 5.09	6.79 $\pm$ 5.33	6.29**	.03
Marital status				35.26***	.19
Single	4.6	33.4	20.8		
Married/co-habiting	49.2	42.2	51.7		
Separated/divorced	27.7	17.8	22.5		
Widowed	18.5	6.6	5.0		
Employment status				5.95	.11
Employed	29.2	43.0	47.5		
Not currently working	70.8	57.0	52.5		
Ethnicity				7.66	.09
Caucasian	83.1	76.5	85.8		
African	4.6	9.6	4.2		
Other/Unknown	12.3	13.9	10.0		
Mode of transmission				336.44***	.58
Sexual intercourse with man	86.2	71.2	11.8		
Sexual intercourse with woman	0.0	0.3	67.2		
IV Drug use	3.1	22.3	10.9		
Blood products	7.7	2.2	6.7		
Unknown	3.1	4.1	3.4		
HIV stage				5.48	.07
Asymptomatic	60.0	64.4	67.2		
Symptomatic	16.9	11.2	16.0		
AIDS	16.9	17.2	13.4		
Unknown	6.2	7.2	3.4		
CD4+ T-cell count <sup>a</sup>				4.19	.07
< 200 cells/mm <sup>3</sup>	23.2	18.6	19.6		
201 e 499 cells/mm <sup>3</sup>	33.9	43.9	49.5		
> 500 cells/mm <sup>3</sup>	42.9	37.5	30.8		
cART				3.68	.09
Yes	61.4	68.3	75.5		
No	38.6	31.7	24.5		
Other co-infections				3.98	.09
Yes	10.8	18.6	12.5		
No	89.2	81.4	87.5		

Note: Continuous variables presented as mean  $\pm$  standard deviation; categorical variables are presented as percentage (%); <sup>a</sup> CD4 T-cell count was stratified into three groups based on clinically meaningful cut-off points: < 200 cells/mm<sup>3</sup>, 201-499 cells/mm<sup>3</sup>; and > 500 cells/mm<sup>3</sup> (CDC, 1992).

\*\*  $p < .01$ ; \*\*\*  $p < .001$

Table 2

Descriptive statistics (T-scores) of the psychopathological symptoms for the three study groups (adjusted for covariates<sup>a</sup>)

	(A)	(B)	(C)	<i>F</i>	Post hoc
	Women ≥ 50 years	Women < 50 years	Men ≥ 50 years		
	( <i>n</i> = 65)	( <i>n</i> = 323)	( <i>n</i> = 120)		
	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )	<i>M</i> ( <i>SE</i> )		
Somatization	52.29 (1.30)	51.28 (0.58)	48.93 (0.95)	3.00	
Obsessions-Compulsions	51.12 (1.35)	50.93 (0.60)	48.35 (0.98)	2.74	
Interpersonal sensitivity	49.51 (1.36)	51.49 (0.60)	47.93 (0.98)	4.88**	B > C
Depression	51.27 (1.35)	50.95 (0.60)	48.61 (0.98)	2.32	
Anxiety	51.27 (1.31)	51.16 (0.58)	46.71 (0.95)	3.48	
Hostility	48.49 (1.26)	51.27 (0.56)	47.40 (0.91)	7.20**	B > C
Phobic anxiety	50.50 (1.36)	51.37 (0.60)	48.81 (0.99)	2.43	
Paranoid ideation	48.81 (1.26)	50.88 (0.56)	47.62 (0.92)	4.84**	B > C
Psychoticism	49.34 (1.29)	50.65 (0.57)	48.48 (0.93)	2.04	
Global Severity Index (GSI) <sup>b</sup>	50.56 (1.32)	51.25 (0.59)	48.02 (0.96)	4.12	

<sup>a</sup> Multivariate analysis of variance adjusted for education, marital status, mode of HIV transmission and time since HIV diagnosis.

<sup>b</sup> Univariate analysis of variance adjusted for education, marital status, mode of HIV transmission and time since HIV diagnosis.

\*\*  $p < .01$

Table 3  
 Proportion of the study groups meeting criteria for caseness (T-score  $\geq$  63)

	Women $\geq$ 50 years	Women < 50 years	Men $\geq$ 50 years	$\chi^2$	Cramer's <i>V</i>
	( <i>n</i> = 65)	( <i>n</i> = 323)	( <i>n</i> = 120)		
	<i>n</i> (%)	<i>n</i> (%)	<i>n</i> (%)		
Somatization	13 (20.0)	50 (15.5)	11 (9.2)	4.57	.10
Obsessions-Compulsions	9 (13.8)	51 (15.8)	13 (10.8)	1.76	.06
Interpersonal sensitivity	7 (10.8)	57 (17.6)	7 (5.8)	10.79**	.15
Depression	12 (18.5)	52 (16.1)	12 (10.0)	3.28	.08
Anxiety	11 (16.9)	53 (16.4)	12 (10.0)	3.05	.08
Hostility	5 (7.7)	57 (17.6)	9 (7.5)	9.94**	.14
Phobic anxiety	11 (16.9)	54 (16.7)	11 (9.2)	4.15	.09
Paranoid ideation	8 (12.3)	54 (16.7)	7 (5.8)	8.94*	.13
Psychoticism	10 (15.4)	53 (16.4)	12 (10.0)	2.88	.08
Global Severity Index (GSI)	7 (10.8)	61 (18.9)	8 (6.7)	11.30**	.15

\*  $p < .05$ ; \*\*  $p < .01$

Table 4  
Univariate logistic regression for variables associated with GSI T-score  $\geq 63$

	Women $\geq 50$ years		Women $< 50$ years		Men $\geq 50$ years	
	OR [95% CI]	<i>p</i>	OR [95% CI]	<i>p</i>	OR [95% CI]	<i>p</i>
Age (years)	1.11 [0.99-1.25]	.075	1.01 [0.97-1.05]	.642	0.99 [0.89-1.10]	.803
Education (years)	0.82 [0.57-1.17]	.280	1.03 [0.96-1.10]	.477	1.04 [0.91-1.19]	.542
Employment status	2.70 [0.30-24.10]	.374	1.21 [0.68-2.13]	.518	0.90 [0.21-3.77]	.884
Marital status	1.33 [0.27-6.49]	.722	1.60 [0.89-2.89]	.115	1.07 [0.26-4.51]	.922
Ethnicity	0.86 [0.44-1.68]	.650	0.80 [0.09-7.40]	.844	-	-
CD4+ T-cell count	1.00 [1.00-1.00]	.260	1.00 [1.00-1.00]	.604	1.00 [1.00-1.00]	.535
HIV stage	0.88 [0.18-4.28]	.870	0.59 [0.33-1.05]	.074	1.50 [0.29-7.80]	.630
Mode of transmission	0.15 [0.03-0.86]	.033	0.99 [0.54-1.83]	.985	0.82 [0.16-4.32]	.813
Time since HIV diagnosis (years)	0.96 [0.79-1.16]	.652	1.03 [0.97-1.08]	.369	1.11 [0.99-1.25]	.088
cART	0.60 [0.11-3.40]	.564	0.84 [0.40-1.73]	.629	0.42 [0.05-3.56]	.424
Other co-infections	0.69 [0.07-6.77]	.752	0.51 [0.27-0.97]	.041	-	-

*Note:* Employment status [0= Employed; 1 = Unemployed or not currently working]; Marital status [0 = Living alone; 1 = Living with partner]; HIV stage [0 = Asymptomatic; 1 = Symptomatic/AIDS]; Mode of transmission [0 = Other; 1 = Sexual]; cART [0 = No; 1 = Yes]; Other co-infections [0 = No; 1 = Yes].

Table 5  
Univariate and multivariate logistic regression analysis of study variables associated with GSI T-score  $\geq 63$  ( $N = 508$ )

	Univariate analysis		Multivariate analysis <sup>a</sup>	
	OR [95% CI]	<i>P</i>	OR [95% CI]	<i>p</i>
Study groups		.005		.027
Women < 50 years vs. Men $\geq$ 50 years	3.26 [1.51-7.04]	.003	2.67 [1.22-5.84]	.014
Women $\geq$ 50 years vs. Men $\geq$ 50 years	1.69 [0.58-4.89]	.333	1.41 [0.46-4.29]	.548
Education (years)	1.03 [0.97-1.09]	.315	-	-
Employment status	1.23 [0.74-2.02]	.426	-	-
Marital status	1.59 [0.96-2.65]	.071	1.56 [0.91-2.68]	.104
Ethnicity	0.86 [0.46-1.60]	.631	-	-
CD4+ T-cell count	1.00 [1.00-1.00]	.590	-	-
HIV stage	0.68 [0.41-1.13]	.134	0.75 [0.44-1.28]	.291
Mode of transmission	0.76 [0.44-1.30]	.312	-	-
Time since HIV diagnosis (years)	1.04 [0.99-1.09]	.089	1.03 [0.98-1.08]	.225
cART	0.77 [0.41-1.45]	.426	-	-
Other co-infections	0.56 [0.31-1.01]	.055	0.66 [0.35-1.24]	.198

*Note:* Employment status [0= Employed; 1 = Unemployed or not currently working]; Marital status [0 = Living alone; 1 = Living with partner]; Ethnicity [0 = Caucasian; 1 = African/Other/Unknown]; HIV stage [0 = Asymptomatic; 1 = Symptomatic/AIDS]; Mode of transmission [0 = Other; 1 = Sexual]; cART [0 = No; 1 = Yes]; Other co-infections [0 = No; 1 = Yes].

<sup>a</sup> Only the covariates associated with GSI T-score  $\geq 63$  in the univariate analysis (two-sided *p*-value < .20) were included in the multivariate logistic regression model.