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## Barriers to HIV Medication Adherence: Examining Distinct Anxiety and Depression Symptoms among Women Living with HIV Who Experienced Childhood Sexual Abuse

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### Abstract

Experiencing sexual violence in childhood or adolescence is highly prevalent among some women living with HIV, often resulting in anxiety and depression symptoms in adulthood. Anxiety and depression have been associated with HIV medication nonadherence, yet little research has assessed distinct components of anxiety and depression as risk factors of HIV medication nonadherence. The current study examined distinct symptom components of anxiety and depression as predictors of HIV medication nonadherence among women living with HIV and childhood sexual abuse enrolled in a coping intervention. This secondary analysis included a sample of 85 women living with HIV and childhood sexual abuse and being prescribed antiretroviral medication who completed measures on anxiety, depression, and medication adherence. Results from a logistic regression analysis suggest that distinct components of anxiety may be related to medication nonadherence among this population. Targeted mental health interventions for this population may increase adherence to antiretroviral medication.

## Keywords

Childhood sexual abuse; depression symptoms; anxiety symptoms; women; HIV medication adherence

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## INTRODUCTION

Adequate adherence to HIV medication (>90%)<sup>1</sup> is a necessary component of long-term HIV disease management, leading to reduced HIV viral load and HIV transmission, and prolonged survival.<sup>1-4</sup> Although adherence to HIV medications is associated with improved health-related outcomes, women living with HIV are reporting significantly lower adherence compared to men.<sup>5-10</sup> These findings are troubling, considering a higher percentage of women are being prescribed antiretroviral therapy compared to men.<sup>11</sup> There is a need to examine barriers to medication adherence among women living with HIV in order to design gender-specific adherence interventions and improve health-related outcomes.

Women living with HIV who have experienced childhood sexual abuse (CSA) may be particularly vulnerable to HIV medication nonadherence, yet there is a paucity of studies that examine behavioral barriers to medication adherence among this population.<sup>12,13</sup> CSA can be highly traumatic and result in negative short and long term physical, emotional and social consequences,<sup>14-17</sup> and has been linked to medication nonadherence.<sup>18,19</sup> The prevalence of CSA among women living with HIV is between 31% and 52%.<sup>20-23</sup> Women living with HIV report experiencing higher rates of CSA compared to men living with HIV<sup>21</sup> and HIV-negative women.<sup>24</sup>

Several long-term mental health consequences of CSA, such as anxiety and depression,<sup>13,23</sup> are also strongly correlated with medication nonadherence and other adherence-related health outcomes such as HIV disease progression and increased mortality.<sup>25-31</sup> One study found that anxiety symptoms were the best predictor of the association between suboptimal medication adherence and dosage instructions, suggesting that in the presence of anxiety, a patient's ability to adhere to dosage instructions becomes compromised.<sup>32</sup> Similarly, clinical studies have found a significant improvement in HIV medication adherence among people living with HIV who are engaged in mental health treatment.<sup>33-35</sup> In particular, a multi-site cohort study found that highly active antiretroviral therapy utilization significantly increased among clinically depressed women living with HIV that were receiving antidepressants and therapy compared to clinically depressed women living with HIV not receiving depression treatment.<sup>34</sup> Though this research is meaningful, investigating the unique contributions of distinct symptom components of anxiety (i.e. autonomic, subjective, neurophysiological, panic-related) and depression (i.e. positive affect, depressed affect, somatic, interpersonal) rather than global constructs could be critical in informing targeted psychosocial interventions to improve adherence for women living with HIV who have experienced CSA.

The medication adherence literature related to other chronic diseases, such as end-stage renal disease (ESRD) and cardiovascular diseases, indicates that specific symptom components of depression may differentially impact medication adherence and treatment regimens.<sup>36,37</sup> For example, depressed affect was an important predictor of poor medication

adherence among ESRD patients.<sup>36</sup> Similarly, positive affect induction greatly improved medication adherence among African American hypertensive patients.<sup>37</sup> These findings suggest potential unique effects of distinct symptom components on medication adherence for other health-related outcomes. Although a previous study found that elevated levels of the positive affect subscale of the Center for Epidemiology Studies-Depression Scale (CES-D) were associated with increased survival time among men living with HIV,<sup>38</sup> we are aware of no study that has examined whether distinct anxiety or depression symptom components predict HIV medication nonadherence.

Therefore, this study takes a novel approach to address this gap in knowledge by examining whether distinct anxiety symptom components (i.e. subjective, neurophysiological, panic-related, autonomic) and depression symptom components (i.e. somatic, positive affect, depressed affect, interpersonal) uniquely affect adherence to HIV medication among a sample of women living with HIV who have experienced CSA. Hypotheses specific to this relationship are considered exploratory.

## METHODS

### Participants

The current study was a secondary data analysis of a larger study of a randomized, clinical trial of a group coping intervention for HIV-positive patients who have experienced CSA.<sup>39-41</sup> Participants were recruited in New York City from community-based and public health organizations, such as AIDS-service organizations and healthcare clinics. Brochures were disseminated describing the intervention and advertising the study. Inclusion criteria were: (a) HIV-positive, (b) experiences of childhood sexual abuse, and (c) 18 years of age or older. Child sexual abuse was determined using a modified version of the Traumatic Experiences Questionnaire.<sup>42</sup> The criterion for childhood sexual abuse was met if: the participant experienced sexual victimization before the age of 18 by an adult or by someone at least 5 years older than the participant at the time of incident. Being prescribed antiretroviral medication was not an inclusion criterion for the larger study. Participants were excluded and referred for immediate services if they were experiencing acute distress due to sexual revictimization in the past month, acute psychosis or impaired mental status, and/or extreme distress evidenced by suicidal intention or severe depression as suggested by a score over 30 on the Beck Depression Inventory.<sup>43</sup>

### Procedure

A structured clinical interview assessed participants' sociodemographics, histories of sexual victimization, depression, mental status, and participant risk to self or others. Of 333 participants screened, 21 were deemed ineligible for the following reasons: seven had not experienced sexual abuse, seven were severely depressed, six demonstrated cognitive impairment, and one had experienced acute sexual victimization. Additionally, 41 participants failed to appear to the baseline assessment. A total of 138 men and 133 women were enrolled in the clinical trial and completed a self-administered, computer-assisted baseline assessment measuring anxiety and depression symptoms and HIV medication adherence.

The current study focused on women living with HIV who had experienced CSA and were receiving antiretroviral treatment. A subsample of 85 women who met these criteria was identified and used in the current study. All affiliated institutional review boards approved the study procedures.

## Measures

**Anxiety symptom severity components**—Anxiety symptom severity was assessed using the Beck Anxiety Inventory (BAI).<sup>44</sup> The BAI is a 21-item measure that assesses frequency of anxiety and somatic symptoms over the past week across four distinct symptom components: subjective, neurophysiological, autonomic, and panic-related. Six items measured subjective symptoms (e.g., “I was unable to relax”), seven items measured neurophysiological symptoms (e.g., “I felt numb”), four items measured autonomic symptoms (e.g., “My face felt flushed”), and four items measured panic-related symptoms (e.g., “I had difficulty breathing”). Responses were measured on a 4-point scale with scores ranging from 0 (rarely) to 3 (most of the time). Responses were summed to obtain a symptom severity score. Cronbach’s alphas were .87, .84, .70, and .79 for subjective, neurophysiological, autonomic, and panic-related anxiety, respectively. Cronbach’s alpha for the total scale was .92.

**Depression symptom severity components**—Depression symptom severity was assessed using the Center for Epidemiologic Studies-Depression Scale (CES-D).<sup>45</sup> The CES-D is a 20-item measure that assesses frequency of depressive symptoms over the past week across four distinct symptom components: positive affect, depressed affect, somatic, and interpersonal. Four items measured positive affect symptoms (e.g., “I felt I was just as good as other people”), seven items measured depressed affect symptoms (e.g., “I felt depressed”), seven items measured somatic symptoms (e.g., “My sleep was restless”), and two items measured interpersonal symptoms (e.g., “People were unfriendly”). Responses are measured on a 4-point scale with scores ranging from 0 (rarely) to 3 (most of the time). Responses were summed, with the exception of the positive affect symptoms, to obtain a symptom severity scores. The positive affect symptoms were reversed coded and then summed to obtain a severity score. Cronbach’s alphas were .69, .92, .86 for positive affect, depressed affect, and somatic, respectively. The inter-item correlation for interpersonal symptoms is  $r = .70$ . Cronbach’s alpha for the total scale was .91.

**HIV medication adherence**—Participants were asked if they were currently being prescribed antiretroviral medication and, if so, to assess their adherence as a percentage in the past week using a scale of 0–100 (0=not at all, 100=all the time). This variable was then dichotomized as (0=less than 90% adherent, 1=greater than or equal to 90% adherent).

**Sociodemographic variables**—Participants were asked their age (in years), race, current income range, and education (in years).

## Data analysis

All analyses were performed using SPSS 19 (SPSS Inc., Chicago, IL). Descriptive statistics were used to determine sample characteristics, anxiety symptom severity scores, depression

symptom severity scores, and HIV medication adherence. Bivariate correlational analyses used Pearson's correlation and point-biserial correlation to examine variables of interest. Statistically significant predictors of HIV medication adherence ( $p < .05$ ) and demographic covariates were included in a hierarchical logistic regression model. HIV medication adherence served as an outcome variable with 0=not adherent and 1=adherent. In the first step, race, income, and education were entered simultaneously as potential covariates with HIV medication adherence. In the second step, only anxiety and depression symptom severity components that were statistically significant at the bivariate level were entered simultaneously as predictors of HIV medication adherence.

## RESULTS

### Sample characteristics

The sample was comprised of 85 women. Table 1 displays the sociodemographics for the sample. The average age was 44 years ( $SD=7$ ). Their racial and ethnic makeup was 72.9% ( $n=62$ ) Black, 7.1 % ( $n=6$ ) White, 1.1% ( $n=1$ ) American Indian or Alaska Native, and 2.3% ( $n=2$ ) more than one race. Of the 16.4 % ( $n=14$ ) Hispanic women, 6 also identified as White, 1 identified as Black, and 4 identified as more than one race. Sixty-nine women (81.2%) reported their income between \$0 and \$9,999, eleven women (12.9%) between \$10,000, and \$19,999, and five women (5.9%) between \$20,000 and \$29,999. The mean level of education was 11.5 years ( $SD=2.1$ ).

### Associations between Anxiety, Depression, and Medication Adherence

Results from the bivariate correlations showed that the covariates (i.e., age, race, education, and income) were not significantly associated with any of the symptom components of anxiety and depression or medication adherence (Table 2). Four of the anxiety severity symptom components (i.e., neurophysiological, subjective, autonomic, and panic-related) were positively correlated with three of the depression severity symptom components (i.e., depressed affect, interpersonal, and somatic). Positive affect depression severity was the only symptom component not associated with any other symptom component.

Only 68.2% of the women were at least 90% adherent to HIV medication in the past week. Of the four distinct symptom components of anxiety, only two were significantly correlated with HIV medication adherence: neurophysiological ( $r = -0.27$ ) and panic-related ( $r = -0.36$ ). None of the distinct symptom components of depression were correlated with HIV medication adherence and therefore were not entered into the final model.

### Predicting Medication Adherence with Anxiety Symptom Components

Results from a logistic regression analysis revealed that panic-related anxiety severity ( $\beta = -0.33$ ,  $p < 0.01$ ) was significantly inversely related to HIV medication adherence (Table 3). Women living with HIV who have experienced CSA who report high levels of panic-related anxiety were 0.71 times less likely to be 90% adherent to HIV medications compared to women reporting low levels of panic-related anxiety [ $OR=0.71$ , 95% CI, 0.54–0.93]. This model was statistically significant,  $X^2 = 13.3$ ,  $p < 0.01$  and accounted for approximately 25% of the variance explained.

## DISCUSSION

Anxiety and depression symptoms are known correlates of impaired self-care behaviors,<sup>46</sup> and the primary goal of this study was to examine whether distinct symptom components of each of these mental health problems uniquely influenced HIV medication adherence among women living with HIV who have experienced CSA. Findings from the bivariate analyses indicate that neurophysiological and panic-related anxiety symptom severity was associated with HIV medication nonadherence. However, results from the multivariate analyses show that only panic-related anxiety symptom severity uniquely predicted HIV medication nonadherence. These findings highlight the importance of anxiety symptoms, and in particular, distinguishing the unique contributions of each symptom component of anxiety, on HIV medication adherence.

There is a burgeoning literature that focuses on the effects of anxiety and depression symptomatology on HIV medication adherence. Our findings extend this work by identifying unique associations of anxiety symptom components with HIV medication adherence among women living with HIV who have experienced CSA. These findings are consistent with extant literature that demonstrates an association between anxiety symptoms and HIV medication adherence.<sup>32,47</sup> Expanding previous work, our findings suggest that symptoms of panic-related anxiety severity (i.e., difficulty breathing, fear of dying, heart palpitations, and choking) are uniquely and negatively correlated with HIV medication adherence. For women living with HIV who have experienced CSA, engagement in HIV self-care behaviors, such as taking ART medication, could be a trigger for traumatizing lived experiences such as victimization, internalized HIV stigma, and events that may have contributed to HIV infection. Thus, re-experiencing traumatic events could manifest physiologically and through panic-related anxiety symptoms. Further, experiencing panic-related anxiety symptoms may interfere with logistical issues related to HIV medication adherence, such as following the dosage and schedule instructions. Previous studies have demonstrated that treatments focused on depression have improved HIV medication adherence;<sup>33,35</sup> thus, given our findings, it would be valuable for future studies to examine the efficacy of psychosocial interventions to improve HIV medication adherence by targeting distinct anxiety symptom components among women living with HIV who have experienced CSA.

Coping behaviors may play a critical role in women's engagement in HIV self-care behaviors. Avoidant coping behaviors and denial have been associated with poor HIV outcomes.<sup>48</sup> In particular, women with a heightened sense of fear around health-decline and death may use avoidant coping behaviors to manage their anxiety, resulting in poor self-care behaviors such as HIV medication nonadherence. For women living with HIV who have experienced CSA, it may be helpful for future research to differentiate between generalized and event-specific mental health problems (i.e. illness-related anxiety, sexual victimization-specific PTSD) in order to develop more effective behavioral interventions. In addition, it may be warranted to examine the effect of distinct symptom components of anxiety and depression on HIV and other self-care behaviors (e.g., engagement in HIV care, sexual safety, nutrition, sleep, exercise) among women living with HIV who have experienced sexual violence. On the other hand, adaptive coping strategies may provide women living

with HIV who have experienced CSA with a sense of empowerment and agency; thus leading to health-promoting behaviors. For example, Dale et al.<sup>49</sup> found that resiliency was related to optimal medical adherence among women living with HIV who experienced abuse. It may be useful for future research to examine resilience as a buffer on the association between anxiety symptoms and HIV medication adherence.

Surprisingly, our study found that symptom components of depression did not correlate or significantly predict HIV medication nonadherence among women living with HIV who have experienced CSA. This finding is inconsistent with current literature that suggests depression is associated with HIV medication nonadherence.<sup>28,50–52</sup> This may be due to the fact that 26% of women in the current study sample endorsed being prescribed antidepressants. Antidepressant use has been associated with improved HIV medication adherence.<sup>53</sup> Moreover, the current study sample identified primarily as African-American women (72.9%). In the United States, African-American women represent almost 64% of HIV-related deaths among women<sup>54</sup> and recent studies suggest that racial and ethnic minority women may be at a greater risk of discontinuation of antiretroviral therapy<sup>55</sup> and report lower adherence<sup>49</sup> compared to other women living with HIV. Although depression is a known barrier of HIV medication adherence, it may not be the most salient predictor among African American women living with HIV who have experienced CSA. Recent literature suggests that patient satisfaction with providers, not depressive symptoms, is a stronger predictor of HIV medication adherence for African-Americans compared to White Caucasians living with HIV.<sup>56</sup> For African-American women living HIV, a positive patient-provider relationship could influence attitudes surrounding taking medications, engagement in self-care behaviors, and maintaining a positive outlook on survival outcomes. It may be useful for future research to examine the moderating role of the patient-provider relationship on the association between CSA, depression, anxiety and medication adherence by race and ethnicity among women living with HIV.

Our understanding of HIV medication adherence issues specific to women living with HIV who have experienced CSA is critical for informing psychosocial treatment and adherence interventions. Our sample was composed of women living with HIV who have experienced CSA, all of whom had been prescribed antiretroviral medication. However, only 68% of the women were at least 90% adherent. This suggests that this sample of women living with HIV who have experienced CSA have poorer adherence; thus, interventions are needed to address adherence challenges and contextual factors that uniquely affect women living with HIV who have experienced CSA. For example, many women who have experienced CSA have reported feeling globus pharynges.<sup>57</sup> Women describe this condition as a persistent feeling that a lump is present in the throat, which can cause difficulties ingesting medications. Not only does this condition exacerbate physiological issues that interfere with medication adherence but may also increase women's vulnerability to experiencing panic-related anxiety symptoms, contributing to HIV medication nonadherence.

Although our study has extended extant literature on HIV medication adherence, these findings should be interpreted under important study limitations. First, all of the participants were recruited in New York City from a group intervention for coping with HIV among those who have experienced CSA, which may limit generalizability. Second, this study used

self-reported data, which is subject to social desirability and recall bias. Previous studies have suggested that self-reported medication adherence might overestimate and mask the patient's true adherence level.<sup>58</sup> Future studies should consider incorporating both self-reported and electronic monitoring of HIV medication adherence to provide a more accurate assessment of adherence. Finally, individuals included in the current study were a sample of 85 women living with HIV who have experienced CSA and who were being prescribed antiretroviral medications. The small sample size may reduce the generalizability of the findings. Future studies may need to include larger sample sizes and longitudinal study designs to examine how the relationship between symptom severity components of anxiety and medication adherence changes in relation to time

People living with HIV who have experienced CSA have poorer HIV medication adherence than people living with HIV without a history of CSA, likely in part due to the mental health sequelae of sexual abuse.<sup>19,59,60</sup> Understanding how the mental health sequelae of sexual abuse affect HIV medication adherence and engagement in self-care behaviors in adulthood is key to reduce mortality rates and HIV disease progression. This study utilized a unique approach to examine the associations of specific anxiety and depression symptom components on HIV medication adherence among women living with HIV who have experienced CSA. Our results suggest that clinicians should screen for and monitor anxiety symptoms among women living with HIV who have experienced CSA, and be prepared to address symptoms and help women learn techniques to self-manage their panic-related anxiety symptoms. Promoting self-management skills for panic-related anxiety symptoms could improve HIV medication adherence rates among women living with HIV who have experienced CSA. Finally, targeting specific symptom components of anxiety may be more useful than global constructs in psychosocial treatment and adherence interventions.

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**Table 1**

## Demographics of sample (N=85)

<i>Demographics</i>	<i>% (N)</i>
Age, <i>M</i> (SD), y	44.71 (7.32)
Household Income	
\$0 – \$9,999	81.2 (69)
\$10,000 – \$19,999	12.9 (11)
\$20,000 – \$29,999	5.9 (5)
Race	
Black	72.9 (62)
White	7.1 (6)
Hispanic/Latina	16.4 (14)
More than one race	3.5 (3)
Years of Education	11.5 (2.11)
<i>Outcome</i>	
HIV Medication Adherence (> =90%)	68.2 (58)
<i>Predictors</i>	<i>M (SD)</i>
Subjective Anxiety Severity	12.0 (4.47)
Neurophysiological Anxiety Severity	12.2 (4.29)
Autonomic Anxiety Severity	7.37 (2.53)
Panic-Related Anxiety Severity	6.68 (2.86)
Depressed Affect Depression Severity	7.87 (6.09)
Somatic Depression Severity	8.20 (5.16)
Interpersonal Depression Severity	1.30 (1.46)
Positive Affect Depression Severity	6.34 (2.37)

Data are % (N) unless otherwise indicated. *M* = mean; SD = standard deviation; y = years

**Table 2**

**Bivariate Correlations Among Study Variables**

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. HIV Medication Adherence <sup>a</sup>	—												
2. Subjective Anxiety Severity	-.192	—											
3. Neurophysiological Anxiety Severity	-.272*	.740***	—										
4. Autonomic Anxiety Severity	-.059	.557***	.474**	—									
5. Panic-Related Anxiety Severity	-.360**	.788**	.721**	.571**	—								
6. Depressed Affect Depression Severity	-.111	.767**	.597**	.482**	.694**	—							
7. Somatic Depression Severity	-.018	.752**	.609**	.486**	.639**	.855**	—						
8. Interpersonal Depression Severity	-.152	.572**	.484**	.280**	.469**	.558**	.475**	—					
9. Positive Affect Depression Severity	-.169	.116	.150	.046	.163	.121	.138	-.044	—				
10. Age	.094	-.137	-.048	.056	-.186	-.143	-.126	-.079	-.059	—			
11. Race	.095	.053	.035	.209	.129	.144	.165	-.071	-.065	.148	—		
12. Education	-.084	-.158	-.098	-.041	-.069	-.100	-.145	-.083	-.078	.038	.083	—	
13. Income	-.153	-.082	.072	-.067	-.025	-.124	-.042	-.109	-.074	.070	.126	.205	—

\*  $p < 0.05$  level.

\*\*  $p < 0.01$  level.

<sup>a</sup> Point-biserial correlation

**Table 3**

Hierarchical Logistic Regression Predicting HIV Medication Adherence

	<b>B (S.E.)</b>	<b>Wald</b>	<b>OR</b>	<b>95% C.I.</b>	<b>Nagelkerke R<sup>2</sup></b>	<b>-2 Log Likelihood</b>
Step 1 <sup>a</sup>					0.05	102.77
Race	0.18 (0.16)	1.17	1.19	0.86–1.66		
Education	-0.07 (0.11)	0.37	0.93	0.74–1.17		
Income	-0.58 (0.42)	1.89	0.55	0.24–1.28		
Step 2 <sup>b</sup>					0.25	89.40***
Race	0.28 (0.18)	2.49	1.32	0.93–1.88		
Education	-0.13 (0.13)	1.04	0.87	0.67–1.13		
Income	-0.72 (0.46)	2.37	0.48	0.19–1.21		
Neurophysiological Anxiety Severity	0.007 (0.08)	0.01	1.00	0.84–1.19		
Panic-Related Anxiety Severity	-0.33 (0.13)	5.89	0.71*	0.54–0.93		

<sup>a</sup>Race, education, and income were entered in the first block.

<sup>b</sup>Neurophysiological Anxiety Severity and Panic-Related Anxiety Severity were entered in the second block.

\*  $p < 0.01$ ;

\*\*\*  $p < 0.005$