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The Association of Trauma with the Physical, Behavioral, and Social Health of Women Living with HIV: Pathways to Guide Trauma-informed Health Care Interventions.

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The Association of Trauma with the Physical, Behavioral, and Social Health of Women Living with HIV: Pathways to Guide Trauma-informed Health Care Interventions

**Abstract**

**Background:** Trauma is increasingly recognized as a near-universal experience among women living with HIV (WLHIV) and a key contributor to HIV acquisition, morbidity, and mortality.

**Methods:** We present data from the baseline analysis of a planned intervention trial of the impact of trauma-informed health care on physical, mental, and social health outcomes of WLHIV in one clinic, with particular focus on quality of life and viral suppression. Data were collected through interviewer-administered surveys and electronic health record data abstraction.

**Results:** Among 104 WLHIV, 97.1% of participants reported having experienced lifetime trauma, and participants had experienced on average 4.2 out of 10 Adverse Childhood Experiences (ACEs). WLHIV with more lifetime trauma were significantly more likely to report PTSD, depression, and anxiety symptoms; significantly more likely to report potentially harmful alcohol and drug use; and had significantly poorer quality of life. In addition, women who had experienced more lifetime trauma were significantly less likely to report being on and adhering to HIV medications, although trauma was not significantly associated with having an undetectable HIV viral load.

**Conclusion:** These data suggest that trauma is associated with much of the morbidity and mortality experienced by women living with HIV. The results of this study support the implementation and study of trauma-informed approaches to healthcare for WLHIV.

**Key Words:** women, HIV, trauma, trauma-informed care, quality of life, viral load, adverse childhood experiences

## **INTRODUCTION**

More than one-quarter of a million women in the United States are currently living with HIV (Centers for Disease Control and Prevention, 2018a), and many women living with HIV (WLHIV) fare poorly on the HIV Care Continuum (Centers for Disease Control and Prevention, 2018b). In 2015, only 50% of WLHIV were retained in care and 48% achieved HIV viral suppression (Centers for Disease Control and Prevention, 2018a). Despite the broad availability of effective antiretroviral medications, WLHIV also experience high rates of morbidity and mortality compared to the general population (Hessol, Schwarcz, Hsu, Shumway, & Machtinger, 2018).

Trauma is increasingly recognized as a near-universal experience among WLHIV and as a key contributor to HIV acquisition, morbidity, and mortality. Defined as “an event, series of events, or set of circumstances that is experienced by an individual as physically or emotionally harmful or threatening and that has lasting adverse effects” (Substance Abuse and Mental Health Services Administration, 2014), trauma can include childhood and/or adult physical, sexual, or emotional abuse or neglect, as well as sociostructural violence such as racism, sexism, homophobia, transphobia, xenophobia, or living in a community where violence is common. People living with HIV (PLHIV) experience disproportionately high rates of trauma (Brezing, Ferrara, & Freudenreich, 2015), including rates of childhood sexual abuse that are more than twice the rates among the general population

(Sikkema et al., 2008). Trauma exposure in PLHIV is associated with non-AIDS related deaths (French et al., 2009), and is predictive of experiencing later violence (Decker et al., 2016). It is also closely associated with mental health disorders including depression, PTSD, and anxiety (LeGrand et al., 2015) (Machtinger, Wilson, Haberer, & Weiss, 2012), as well as with increased HIV-risk behavior, including substance use disorders (SUD) (Brezing et al., 2015). HIV diagnosis is itself often highly traumatic (Garrido-Hernansaiz, Murphy, & Alonso-Tapia, 2017).

Among PLHIV, trauma and substance use often function syndemically, as “epidemics interacting synergistically and contributing, as a result of their interaction, to excess burden of disease in a population” (Singer & Clair, 2003). The syndemic of violence/trauma, substance use, and HIV has been identified as one of the main drivers of HIV infection and of poor health outcomes among women living with HIV (Sullivan, Messer, & Quinlivan, 2015). Research has consistently shown high rates of substance use among people living with HIV, and rates that are higher than among the general population (Dawson Rose et al., 2015; Dawson-Rose et al., 2017; Whiteford et al., 2013). Substance use has also been shown to have a negative impact on HIV treatment adherence and virologic suppression (Azar, Springer, Meyer, & Altice, 2010; Lehavot et al., 2011; Lucas, Chaisson, & Moore, 1999).

The link between trauma and health outcomes has led to calls for increased attention to trauma in health care by advocates and government leaders, including the U.S. Preventive Services Health Task Force, the Institute of Medicine, and the Agency for Healthcare Research and Quality (Carey et al., 2010; Institute of Medicine Committee on Preventive Services for Women, 2011; Nelson, Bougatsos, & Blazina, 2012). While an emerging literature describes interventions to address trauma and PTSD among PLHIV (Empson et al., 2017; Meade et al., 2010; Puffer, Kochman, Hansen, & Sikkema, 2011; Seedat, 2012), no prospective study has evaluated the impact of a comprehensive model of trauma-informed health care delivery on health outcomes.

To address this gap, we initiated implementation of a model of trauma-informed health care (TIHC) (Machtinger, Cucca, Khanna, Dawson-Rose, & Kimberg, 2015; Machtinger et al., 2019) in one clinic serving WLHIV in the San Francisco Bay Area. As part of this effort, we are conducting a broad evaluation of the impact of TIHC on patient health outcomes. Here we report results of baseline data analyses, examining the association of trauma with physical, behavioral, and social health indicators, with particular attention to quality of life and undetectable viral load. We then consider how the results of the investigation serve to inform efforts within health care settings to improve outcomes.

## **METHODS**

Quantitative patient data were collected in Fall (2015), before any TIHC changes in the clinic. Data were also collected from clinic staff in a parallel study about the impact of working with a highly traumatized population (C. S. Dawson-Rose, Cuca, Shumway, Davis, & Machtinger, (in review)). The study was approved by the University of California, San Francisco Institutional Review Board.

### ***Procedures***

Women were recruited from the waiting room during regular clinic hours on two half-days each week. Researchers approached patients in the waiting room, briefly explained the purpose of the study and, if a patient was interested, met with her in a private room. At that time, the researchers reviewed consent documents, explained the study procedures including data abstraction from the electronic health record (EHR), and answered any questions. Individuals were eligible to participate if they self-identified as cisgender or transgender women who were 18 years of age or older, were currently receiving primary HIV care at the clinic, and were English-speaking and cognitively able to complete the interview. If the patient was eligible and willing, she signed a general consent form and an EHR data abstraction consent form. Following consent, the researcher conducted the interview by reading each question aloud and marking responses in a survey booklet. At the end of the interview, the participant received a \$25 gift card in

appreciation of her time. Most interviews took 30-45 minutes to complete. After the interview, researchers abstracted relevant data from the participant's EHR.

### ***Measures***

This study was designed as a broad evaluation and, as such, was exploratory in nature. Thus, data were collected on a wide variety of constructs. Two women living with HIV who were not clinic patients or study participants reviewed and provided input on the measures used in the interview.

*Demographics.* We asked participants for general demographic information. Based on observed distributions, we dichotomized race into white women and women of color; and dichotomized education into more than a high school education or not. We dichotomized housing into stable or not; individuals who self-identified as being homeless, living in a car or vehicle, or having lived in a location for fewer than 6 months were characterized as unstably housed. We also used the Household Food Security Survey (Hager et al., 2010), a validated two-item instrument that measures experiences of food insecurity in the past year (yes/no).

Trauma was measured in three ways. First, we measured *childhood trauma* using the Adverse Childhood Experiences (ACE) instrument, which counts 10 types of abuse, neglect, and household dysfunction experienced before the



age of 18 (Centers for Disease Control and Prevention, 2014; Felitti et al., 1998). A cut-off of 4 is commonly used, and prior research has shown that individuals who experienced 4 or more ACEs have significantly greater risk for later poor health outcomes. We also measured *lifetime trauma* using the validated checklist from the Trauma History Screen (THS) to measure exposure to 14 potentially traumatic events from childhood to the present time (Carlson et al., 2011). Finally, we asked whether participants had experienced *recent trauma* based on two questions about sexual coercion and abuse, threats, and victimization in the past 30 days. In our analysis, we found both ACEs and recent trauma to be highly correlated with the Trauma History Screen. For this reason, and because the THS covers both childhood and recent trauma, we use the THS for our analysis.

Empowerment was measured using the Empowerment Scale, a 28-item scale developed with members of self-help communities (Rogers, Chamberlin, Ellison, & Crean, 1997).

Social Support was measured using the 4-item Social Support Survey (Gjesfjeld, Greeno, & Kim, 2008), a shortened version of the original Medical Outcomes Study Social Support Survey (Sherbourne & Stewart, 1991).

Participants self-reported whether they were currently on HIV antiretroviral medications. Thirty-day HIV medication adherence was self-reported, based

on a validated six-point scale (Lu et al., 2008), dichotomized into good 30-day adherence (good, very good, or excellent) or not (very poor, poor, or fair).

We asked participants whether they had disclosed their HIV status to anyone. Of those who had disclosed, we asked, “On a scale of 1-10, how open or ‘out’ are you about your HIV status?” Those who said that they had not disclosed to anyone were given a score of 0.

HIV Stigma was measured using the Sayles Stigma Scale (Sayles et al., 2008), a 28-item instrument that measures internalized stigma through questions about how often certain items happen or are true because of their HIV.

PTSD symptoms were measured using the PTSD Checklist for DSM-5 (Weathers et al., 2013), a 20-item instrument to assess symptom criteria for PTSD (Blevins, Weathers, Davis, Witte, & Domino, 2015). A score of 33 or above (scale of 0-80) indicates a provisional diagnosis of PTSD.

Depression symptoms were assessed using the Patient Health Questionnaire-9, a validated nine-item patient-reported measure of depression symptoms that maps to DSM diagnostic criteria (Kroenke, Spitzer, & Williams, 2001;

Lowe, Kroenke, Herzog, & Grafe, 2004). A score of 10 or above (scale of 0-27) is considered to be indicative of at least moderate depression.

Anxiety symptoms were assessed using the Generalized Anxiety Disorder scale (Spitzer, Kroenke, Williams, & Löwe, 2006), a 7-item self-report scale to measure symptom severity. A score of 10 or above (scale of 0-21) indicates at least moderate anxiety.

Substance use was measured in three ways. Alcohol use was assessed using the short Alcohol Use Disorders Identification Test (AUDIT-C), a 3-item screen to identify individuals who may be hazardous drinkers or who have alcohol use disorders (AUD) (Bradley et al., 2007; Bush, Kivlahan, McDonell, Fihn, & Bradley, 1998). The instrument provides a raw numerical score (0-12); an indicator of binge drinking; and a diagnostic of AUD (score of 3 or more). Drug use was measured using one question from the Alcohol, Smoking and Substance Involvement Screening Test (ASSIST) (Humenuik et al., 2008; WHO Assist Working Group, 2002) asking about substance use in the past three months. We dichotomized this into any non-prescribed drug use (marijuana, cocaine, amphetamines, sedatives, or opioids) in the past 3 months, and a similar variable of “hard” drug use that excludes marijuana. Drug abuse was measured using the Drug Abuse Screening Test 10 (DAST-10) (Skinner, 1982), which yields a score range of 0-10. A score of 3 or greater indicates at least a moderate level of drug abuse.

Quality of Life was measured using the five-item WHO-Five, developed cross-culturally by the World Health Organization (Bech, Moses, & Gomis, 2003; Volinn et al., 2010). The instrument measures self-reported quality of life over the past two weeks in the areas of mood, physical vitality, and interest in life. A score below 13 (scale of 0-25) indicates poor quality of life (Psychiatric Research Unit WHO Collaborating Centre in Mental Health at Frederiksborg General Hospital, nd).

Mental well-being was measured using the seven-item Short Warwick-Edinburgh Mental Wellbeing Scale, which focuses on emotions and mental functioning (Stewart-Brown et al., 2009), and yields a score of 7-35.

*Undetectable viral load.* For participants who consented to having data abstracted from their electronic health record (n=100), we abstracted HIV viral load and CD4 counts. Data were abstracted only if the person had had a test within the past year, and the most recent test result was used. Viral load was dichotomized as detectable or undetectable (<40 copies/mL). For the analysis, we focused on undetectable viral load as the outcome of interest.

Patient-Provider relationship was measured using the Engagement with Health Care Provider scale (Bakken et al., 2000), a 13-item instrument in which clients rate their interactions with their providers (e.g., “My health

care provider listens to me,” “respects my choices,” “engages me in my care”) on a scale of 1 “always” to 4 “never”. Responses are summed to get a total score of 1-52, with lower scores indicated greater engagement.

*Appointment Adherence.* We abstracted EHR data to examine appointment adherence as a proxy for engagement in care. Appointment adherence is the percentage of scheduled clinical appointments that were actually attended (attended/scheduled) (Mugavero, 2008) in the six months prior to the study visit.

## ***Analysis***

First, we generated descriptive statistics to summarize the baseline data. Second, we used bivariate linear and logistic regression analysis to examine relationships between trauma and various indicators of health. Third, we used bivariate linear and logistic regression analysis to examine factors that are associated with the two outcomes of interest: quality of life and undetectable viral load. In past focus group discussions with clinic patients, quality of life emerged as one of the most important outcomes of interest for patients themselves, and it is one that clinicians and other care team members want for patients as well. At the same time, viral suppression is a major focus of the HIV Care Continuum (Centers for Disease Control and Prevention, 2018b) and remains a national priority in HIV/AIDS care and treatment. Thus, we elected to focus on trauma’s impact on one patient-

centered outcome (quality of life) and one HIV Care Continuum outcome (viral suppression) in this analysis. All analyses were conducted using Stata 14 (StataCorp, 2015).

## **RESULTS**

Participants in the study were 104 women living with HIV (Table 1). Four participants identified as transgender or intersex; they were included in all analyses as the intervention being evaluated is clinic-wide and the four women represent an important portion of the clinic's patient population. The participants' mean age was 52 years and almost 80% were women of color. Approximately half had a high school education or less, only 20% were working for pay, and 61% reported food insecurity in the past year. Almost all participants were living in stable housing.

### ***Health Status***

The vast majority of participants (97.1%) had experienced trauma at some point in their lives (Table 2). The mean ACE score was 4.2, and more than half of participants (58.3%) reported four or more ACEs. In this study, lifetime trauma and recent trauma were also common (92.2% and 16.7%), and many participants reported having experienced threats, abuse, and violence as a result of disclosing their HIV status to others (36.5%). Participants who reported four or more ACEs were significantly more likely to

report both lifetime and recent trauma. ACE scores and THS scores were highly correlated (0.686,  $p < 0.00001$ ).

Most study participants had been living with HIV for a substantial number of years, and the majority (86.5%) reported that they were currently on ART medications (Table 2). Of the 96 participants who had available viral load data, 68 had an undetectable viral load (70.8%). Of the 83 participants who reported being on HIV medications and who had available viral load data, 66 (79.5%) had an undetectable viral load. Two participants who reported not being on ART also had undetectable viral loads.

Study participants experienced considerable behavioral health symptoms. One-third met the diagnostic criteria for PTSD (33.0%); almost one-half reported at least moderate levels of depression symptoms (41.8%); and more than one-quarter reported at least moderate levels of anxiety symptoms (27.3%). Although the mean alcohol use disorder screening scores were low overall (1.7 out of 12) and 52.4% of participants reported no current alcohol use at all, 17% of participants reported binge drinking and 22.1% met the threshold for further alcohol use disorder screening, indicating high levels of use among those who do drink. Almost one-half of participants (44.1%) reported tobacco use in the past three months; 27.9% reported use of cocaine, amphetamines, sedatives, and/or illicit opioids in the past 3 months; and 17.3% reported at least moderate levels of drug

abuse, reaching the threshold for further investigation or intensive assessment. Ratings of patient-provider relationship were very high with a mean of 1.2.

We also investigated various forms of social health. Among study participants, the mean total Empowerment Scale score was 3.0 out of a total possible score of 4.0. Mean social support for all participants was 3.2. When asked how open or 'out' they were about their HIV status, 24 (23.3%) reported being completely out, while 24 (23.3%) reported being not at all out, and 7 participants had never told anyone of their HIV-positive status. However, participants overall reported only moderate levels of total HIV-related stigma (mean 2.4). The mean quality of life score was 13.8, with 54.8% of participants scoring below 13, indicating poor quality of life.

### ***Relationship Between Trauma and Health***

Next, we examined relationships between trauma and various indicators of health (Table 3). Experiences of lifetime trauma, as measured by the THS, were significantly associated with ART medication use among participants; for each additional trauma experienced, participants had significantly reduced odds of being on ART medications (OR=0.81, p=0.016). Similarly, participants with higher numbers of trauma experiences had significantly lower odds of reporting good 30-day HIV medication adherence (OR=0.84, p=0.043). In contrast, there were no significant relationships between



trauma and CD4 count, or whether the participant had an undetectable viral load (regardless of ART use).

We then considered the relationship between trauma and behavioral health outcomes. Experiencing more traumatic events was significantly associated with higher PTSD symptom scores (coefficient, 2.51,  $p < 0.0001$ ), higher depressive symptom scores (coefficient, 0.73,  $p < 0.0001$ ), and higher anxiety symptom scores (coefficient, 0.70,  $p < 0.0001$ ), as well as greater odds of reaching the diagnostic thresholds for all three (PTSD: OR, 1.27 [ $p < 0.0001$ ]; depression: OR, 1.18 [ $p = 0.004$ ]; anxiety: OR, 1.13 [ $p = 0.051$ ]). In addition, although higher counts of traumatic events were significantly associated with higher alcohol use scores (coefficient, 0.18;  $p = 0.007$ ), they were not significantly associated with the AUDIT screening threshold that would indicate an alcohol use disorder (OR, 1.13,  $p = 0.050$ ). Higher THS counts were also not associated with self-reported use of tobacco, cannabis, or sedatives in the past three months, but were significantly associated with recent use of cocaine (OR, 1.17;  $p = 0.031$ ), amphetamines (OR, 1.54;  $p = 0.004$ ), and illicit opioids (OR, 1.27;  $p = 0.027$ ). Higher counts on the THS were also associated with higher odds of self-reported overall “hard” drug use (OR, 1.21;  $p = 0.003$ ). Finally, more traumatic experiences was associated with higher drug abuse screening (DAST) raw scores (coefficient, 0.20;  $p = 0.002$ ) and with greater odds of having a positive drug abuse diagnosis (OR, 1.23;  $p = 0.007$ ).

In examining well-being and social health outcomes, we found that trauma was associated with significantly greater HIV stigma (coefficient, 0.05;  $p=0.016$ ). Trauma was also significantly negatively associated with quality of life and mental wellbeing; those with more traumatic experiences had lower quality of life scores (coefficient, -0.66;  $p<0.0001$ ), as well as lower psychological wellbeing scores (coefficient, -0.52;  $p<0.0001$ ). Trauma was not, however, significantly associated with empowerment, social support, or disclosure.

### ***Factors Associated with Quality of Life and Viral Load Outcomes***

As a last step, we used bivariate linear and logistic regression analysis to examine factors that are associated with our main outcomes of interest. White women reported significantly lower quality of life scores compared to women of color (Table 4). Women who had more PTSD, depression, and anxiety symptoms also reported significantly lower quality of life scores (PTSD, -0.21;  $p<0.0001$ ; depression, -0.78;  $p<0.0001$ ; anxiety, -0.76;  $p<0.0001$ ). In contrast, participants who reported greater empowerment and greater social support reported significantly higher quality of life (empowerment, 9.19;  $p<0.0001$ ; social support, 2.24;  $p<0.0001$ ).

In examining undetectable viral load (Table 5) we found that older women and white women had significantly greater odds of having an undetectable

viral load (OR, 1.05;  $p=0.028$ ; OR, 11.49;  $p=0.020$ ), as did women who were currently taking ART medications and those with higher CD4 counts.

However, women who had higher drug abuse screening test scores had significantly lower odds of having an undetectable viral load (OR, 0.77;  $p=0.003$ ).

## **DISCUSSION**

In this sample of women living with HIV, we found near-universal reports of lifetime trauma, including childhood and adult trauma, as well as a significant minority who reported incidents of abuse and threats in the past 30 days. These findings support the growing body of literature documenting high rates of trauma and PTSD among WLHIV (Machtinger, Haberer, Wilson, & Weiss, 2012; Machtinger et al., 2012; Weber & et al., 2012), and uniquely add to it by documenting high mean ACE scores in a population of WLHIV for the first time.

In examining quality of life as one of our two main outcomes of interest, we found that over half of the women experienced poor quality of life despite the broad availability and use of antiretroviral therapy and despite most participants having an undetectable viral load. Those who had experienced more trauma had significantly poorer overall quality of life compared to those who had experienced less trauma. We also found that traumatic experiences were significantly associated with greater symptoms of

depression, anxiety, and PTSD, worse HIV-related stigma, and poorer mental wellbeing. In addition, trauma was associated with greater alcohol and drug use and higher drug abuse screening test scores. The link between adverse childhood experiences and later substance use and substance use disorders has been well described (Dube, Anda, Felitti, Edwards, & Croft, 2002; Dube et al., 2003; Quinn et al., 2016). The high level of substance use in this population is very concerning due to the known disproportionately high rates of death among WLHIV from substance use (Hessol et al., 2018).

In examining the impact of trauma on our second main outcome of interest, we did not find a significant relationship between trauma and having an undetectable viral load. However, trauma was significantly negatively associated with being on antiretroviral medications for HIV and with ART adherence, both of which are key outcomes on the HIV Care Continuum and are key contributors to the likelihood of achieving an undetectable viral load. These findings support prior research that has documented the impact of trauma sequelae such as PTSD and depression symptoms on HIV medication adherence (Vranceanu et al., 2008). For individuals who have experienced significant trauma, the increased risk of PTSD symptoms such as avoidance behaviors, depression, and HIV-related stigma may make it more difficult to engage in self-care and to adhere to treatment regimens. Although we did not identify a significant relationship between trauma and an undetectable viral load, other studies have documented this relationship (Hatcher, Smout,

Turan, Christofides, & Stöckl, 2015; Machtinger et al., 2012; Siemieniuk et al., 2013). In addition, the high rates of virologic suppression in our sample may have affected this study's ability to detect the link between trauma and virologic suppression despite the identified association of trauma with the key predictors of it.

### ***Limitations***

This study had several limitations. First, because the data reported here are cross-sectional, causality cannot be determined. However, the associations between lifetime trauma and poor quality of life, PTSD, depression, anxiety, and substance use suggest a role for trauma in later health outcomes for WLHIV.

Second, the sample size was relatively small. Within this clinic, however, the 104 patients who participated in the study accounted for approximately two-thirds of all clinic patients who were eligible for the study at baseline. At the same time, the clinic population is fairly representative of the national population of women living with HIV, particularly in urban areas. Therefore, the study has some degree of generalizability to the larger population of WLHIV in the United States.

Another limitation of the study was the measurement of trauma. Although we used three different measures that covered childhood, lifetime, and

recent trauma, there are many other types of trauma that we did not measure. For example, although we recorded race, we did not include a specific measure of experiences and impact of racism in the study. Similarly, many patients in the clinic have been involved with the foster care and/or the prison systems, where trauma and violence are common, and we did not record this information or the impact that it may have had on their health outcomes. It is possible that individuals may have experienced other traumatic events that we did not measure.

The overall study, however, has many strengths. These baseline data, as well as data from the parallel study with clinic staff (Dawson-Rose, Cuca, Shumway, Davis, & Machtinger, forthcoming), are being used to inform implementation of TIHC in the clinic. This includes educating staff about the impact of trauma on health, creating a safe and welcoming environment for patients, screening patients for the consequences of trauma, and using data to identify the most effective ways to respond to past and ongoing trauma (Machtinger et al., 2019). In addition, the results presented here are from the baseline stage of a larger longitudinal mixed-methods study that will allow us to evaluate the impact of trauma-informed health care on health outcomes for WLHIV. This larger study includes survey and EHR data collection at multiple times over a number of years, as well as qualitative data collection with both patients and staff to contextualize the findings of survey data. Although this baseline study was neither designed nor powered to elucidate

the pathways to explain the relationship between trauma, poor quality of life, and other poor health outcomes, the results add to a growing recognition that the current national focus on virologic suppression is insufficient as a measure for health and well-being of WLHIV (Dawson-Rose, Roberts, & Gold, 2018).

### **IMPLICATIONS FOR PRACTICE AND/OR POLICY**

The data presented here support the implementation of trauma-informed approaches to health care for WLHIV (Machtinger et al., 2015; Machtinger et al., 2019). TIHC acknowledges and addresses recent and past trauma and PTSD, and has the promise to lead to improved physical, behavioral, and social health outcomes for patients.

### **CONCLUSION**

We found significant associations between lifetime trauma and quality of life, ART medication adherence, substance use, mental health symptoms, and HIV-related stigma. The results of this baseline study as well as the forthcoming prospective study will contribute to an emerging body of literature informing models of TIHC.

**Table 1: Participant Characteristics (N=104)**

	n (%) or Mean $\pm$ SD (Range)
Age	51.6 $\pm$ 10.5 (21-76)
Gender	
Female	100 (96.2%)
Transgender Female	3 (2.9%)
Intersex Female	1 (1.0%)
Race	
African American / Black	50 (48.5%)
White (non-Hispanic)	21 (20.4%)
Asian / Pacific Islander	9 (8.7%)
More than one race	9 (8.7%)
Hispanic / Latino	7 (6.8%)
Other	5 (4.9%)
Native American Indian	2 (1.9%)
Education	
6 <sup>th</sup> grade or less	1 (1.0%)
11 <sup>th</sup> grade or less	20 (19.2%)
High school or GED	33 (31.7%)
2 year of college, Associate/Technical	33 (31.7%)
Degree	10 (9.6%)
College degree	7 (6.7%)
Master's or Doctorate degree	
Work for pay (yes)	21 (20.2%)
Currently on disability (yes)	82 (78.9%)



Housing	
Own home or apartment	2 (1.9%)
Rent home, apartment, SRO	85 (81.8%)
Live with family or friends and pay rent	9 (8.7%)
Live with family or friends and do not pay rent	3 (2.9%)
Homeless	3 (2.9%)
Other	2 (1.9%)
Food insecure (yes)	63 (60.6%)
Year diagnosed with HIV	1996.5 ± 8.5

**Table 2: Trauma and Health Characteristics (N=104)**

	Mean $\pm$ SD or n (%)
<b>Trauma</b>	
ACES (scale 0-10)	4.2 $\pm$ 2.9
Trauma History Screen (scale 0-14)	6.3 $\pm$ 3.9
Trauma in past 30 days (yes)	17 (16.7%)
Any trauma (ACES, THS, or recent)	100 (97.1%)
<b>Physical Health</b>	
Currently taking ART Medications (yes)	90 (86.5%)
30-Day Medication Adherence	
Very poor, Poor, or Fair	13 (14.4%)
Good, Very good, or Excellent	77 (85.5%)
CD4 (n=93)	645 $\pm$ 395
Have “undetectable” viral load (anything <40 copies/mL) (n=96)	68 (70.8%)
<b>Behavioral Health</b>	
PCL-5 (scale 1-80)	25.4 $\pm$ 20.1
Depression (scale 0-27)	9.0 $\pm$ 6.7
Anxiety (scale 0-21)	7.3 $\pm$ 6.0
AUDIT (scale 0-12)	1.7 $\pm$ 2.6
Use of substances in the past 3 months (yes)	
Tobacco	45 (44.1%)
Cannabis	26 (25.5%)
Cocaine	17 (16.8%)
Amphetamines	9 (8.8%)
Sedatives	5 (4.9%)
Opioids	9 (8.8%)
Illicit use in past 3 months (yes)	43 (41.4%)
Illicit use of “hard” drugs in past 3 months (yes)	29 (27.9%)

Drug abuse (scale 0-10)	1.7 ± 2.6
Engagement with health care provider (scale 1-52)	1.2 ± 0.3
Appointment adherence (mean percentage)	70.2 ± 24.2
<b><i>Social Health and General Wellbeing</i></b>	
Total Empowerment (scale 1-4)	3.0 ± 0.3
Social Support (scale 1-5)	3.2 ± 1.1
How open or 'out' are you about HIV? (scale 1-10)	5.4 ± 3.8
HIV Stigma (scale 1-5)	2.4 ± 0.8
Quality of Life (scale 0-25)	13.8 ± 7.1
Well-being (mean, scale 7-35)	22.5 ± 5.2

**Table 3: Linear and Logistic Regression Analysis of the Association of Trauma (Trauma History Screen) on Physical, Behavioral, and Social Health Outcomes (N=104)**

	<b>Continuous Variables</b>	<b>Dichotomous Variables</b>
	Association with THS Score Coefficient (p-value)	Association with THS Score Odds Ratio (p-value)
<b>Physical Health</b>		
Currently taking ART Medications (yes)		<b>0.81 (p=0.016)</b>
Good 30-Day Medication Adherence		<b>0.84 (p=0.043)</b>
CD4 (n=93)	-16.1 (p=0.128)	
Undetectable viral load (yes) (n=96)		0.95 (p=0.342)
Undetectable viral load (yes) among those on meds (n=83)		1.04 (p=0.590)
<b>Behavioral Health</b>		
PTSD symptoms (scale 1-80)	<b>2.51 (p&lt;0.0001)</b>	
Depression symptoms (scale 0-27)	<b>0.73 (p&lt;0.0001)</b>	
Anxiety symptoms (scale 0-21)	<b>0.70 (p&lt;0.0001)</b>	
Alcohol use screening score (scale 0-12)	<b>0.18 (p=0.007)</b>	

Use of substances in the past 3 months (yes)		
Tobacco		1.10 (p=0.067)
Cannabis		1.07 (p=0.247)
Cocaine		<b>1.17 (p=0.031)</b>
Amphetamines		<b>1.54 (p=0.004)</b>
Sedatives		1.37 (p=0.050)
Opioids		<b>1.27 (p=0.027)</b>
Illicit use in past 3 months (yes)		1.10 (p=0.077)
Illicit use of “hard” drugs in past 3 months (yes)		<b>1.21 (p=0.003)</b>
DAST (scale 0-10)	<b>0.20 (p=0.002)</b>	
Engagement with healthcare provider (scale 1-52)	0.0003 (p=0.970)	
Appointment adherence	-0.001 (p=0.833)	
<b><i>Social Health and General Wellbeing</i></b>		
Empowerment (scale 1-4)	-0.002 (p=0.757)	
Social Support (scale 1-5)	<b>-0.1 (p&lt;0.0001)</b>	
“How open or ‘out’ are you about HIV? (scale 1-10)	0.2 (p=0.119)	
HIV Stigma (scale 1-5)	<b>0.05 (p=0.016)</b>	
Quality of Life (scale 0-25)	<b>-0.66 (p&lt;0.0001)</b>	
Wellbeing (mean, scale 7-35)	<b>-0.52 (p&lt;0.0001)</b>	

**Table 4: Linear Regression Analysis of Factors Associated with Quality of Life Outcome (N=104)**

	<b>Coefficient</b>	<b>p Value</b>
Age	-0.002	0.975

Race (White vs. Other)	-3.54	<b>0.042</b>
Education (more than high school vs. less)	-0.74	0.600
Work	0.97	0.578
On disability	0.32	0.853
Stable housing	2.43	0.198
Food insecure	-2.65	0.064
Trauma History Screen	-0.66	<b>&lt;0.0001</b>
Year of HIV diagnosis	0.01	0.899
Currently taking ART medications	1.42	0.490
Good 30-day medication adherence	2.51	0.243
CD4 count	0.003	0.195
Undetectable viral load	-0.52	0.749
PTSD symptom score	-0.21	<b>&lt;0.0001</b>
Depression symptom score	-0.78	<b>&lt;0.0001</b>
Anxiety symptom score	-0.76	<b>&lt;0.0001</b>
AUDIT score	-0.25	0.342
DAST score	-0.41	0.137
Engagement with health care provider	-2.31	0.332
Appointment adherence	5.87	0.063
Empowerment (Total)	9.19	<b>&lt;0.0001</b>
Social support	2.24	<b>&lt;0.0001</b>
Disclosure	-0.16	0.377
Stigma	-0.87	0.301

**Table 5: Logistic Regression Analysis of Factors Associated with Undetectable Viral Load Outcome (N=104)**

	<b>OR</b>	<b>p Value</b>
Age	1.05	<b>0.028</b>
Race (White vs. Other)	11.49	<b>0.020</b>
Education (more than high school vs. less)	1.00	0.940
Work (yes)	0.87	0.796
On disability	1.41	0.520
Stable housing	1.93	0.235
Food insecure	1.05	0.923
Trauma History Screen	0.95	0.342
Year of HIV diagnosis	0.97	0.332
Currently taking ART medications	21.35	<b>&lt;0.0001</b>
Good 30-day medication adherence	1.95	0.323
CD4	1.01	<b>&lt;0.0001</b>
PTSD symptom score	1.01	0.588
Depression symptom score	1.02	0.641
Anxiety symptom score	1.00	0.980
AUDIT score	0.86	0.052
DAST score	0.77	<b>0.003</b>
Engagement with health care provider	1.83	0.547
Appointment adherence	4.52	0.127
Empowerment	1.48	0.607
Social support	1.18	0.416
Disclosure	1.009	0.872
Stigma	0.630	0.088

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