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Prevalence of COVID-19–Related Social Disruptions and Effects on Psychosocial Health in a Mixed-Serostatus Cohort of Men and Women

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Objectives: This study describes prevention behavior and psychosocial health among people living with HIV (PLHIV) and HIV-negative people during the early wave of the coronavirus disease 2019 (COVID-19) pandemic in the United States. We assessed differences by HIV status and associations between social disruption and psychosocial health.

Design: A cross-sectional telephone/videoconference administered survey of 3411 PLHIV and HIV-negative participants in the Multicenter AIDS Cohort Study/WIHS Combined Cohort Study (MWCCS).

Methods: An instrument combining new and validated measures was developed to assess COVID-19 prevention efforts, social disruptions (loss of employment, childcare, health insurance, and financial supports), experiences of abuse, and psychosocial health. Interviews were performed between April and June 2020. Associations between social disruptions and psychosocial health were explored using multivariable logistic regression, adjusting for socio-demographics and HIV status.

Results: Almost all (97.4%) participants reported COVID-19 prevention behavior; 40.1% participants reported social disruptions, and 34.3% reported health care appointment disruption. Men living with HIV were more likely than HIV-negative men to experience social disruptions (40.6% vs. 32.9%; $P < 0.01$), whereas HIV-negative women were more likely than women with HIV to experience social disruptions (51.1% vs. 39.8%, $P < 0.001$). Participants who experienced ≥ 2 social disruptions had significantly higher odds of depression symptoms [aOR = 1.32; 95% confidence interval (CI): 1.12 to 1.56], anxiety (aOR = 1.63; 95% CI: 1.17 to 2.27), and social support dissatisfaction (aOR = 1.81; 95% CI: 1.26 to 2.60).

Conclusions: This study builds on emerging literature demonstrating the psychosocial health impact related to the COVID-19 pandemic by providing context specific to PLHIV. The ongoing pandemic requires structural and social interventions to decrease social disruption and address psychosocial health needs among the most vulnerable populations.

Key Words: people living with HIV, COVID-19, psychosocial health, pandemic disruptions

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leaving many with long-term complications from COVID-19 disease.³ There is strong evidence that chronic comorbidities increase COVID-19 mortality and morbidity risk.^{4–18} People living with HIV (PLHIV) experience high levels of chronic comorbidities,^{19,20} which may increase their risk for severe COVID-19 outcomes; however, evidence for HIV infection as an independent risk factor of COVID-19 mortality is limited, with few studies reporting HIV-specific outcomes.^{21,22}

In Spring 2020, without efficacious treatment or vaccines for COVID-19, and with lagging testing and tracing capacity to prevent SARS-CoV-2 transmission, US public health authorities across states and local jurisdictions implemented a suite of interventions, including physical distancing guidelines; restrictions of nonessential travel; and closure of workplaces, schools, bars, restaurants, and social gathering spaces.²³ Although these interventions effectively reduced SARS-CoV-2 transmissions,^{23,24} the ensuing disruptions to financial and psychosocial well-being have not been thoroughly examined, particularly among PLHIV. Emerging literature demonstrates that impacts to financial and food security, social well-being, and health care were rapidly experienced.^{25–27} High levels of psychological distress were reported in the US populace by March 2020²⁸, by June 2020, more than 40% of US citizens was estimated to have experienced mental and behavioral health adversities, including >30% reporting symptoms consistent with depression or anxiety.²⁹ Traumatic stress symptoms, depression, insomnia, suicidal ideation, loneliness, xenophobia, and financial anxiety have been described as multifactorial aspects to a coronavirus stress response.^{30–32} Other psychosocial effects of COVID-19 include increased reports of intimate partner violence.^{33,34}

As early as March 2020, PLHIV in the United States were reporting heightened anxiety surrounding COVID-19 mortality risk, disruptions to medical care and wellness activities, and loneliness resulting from high adherence to physical distancing recommendations.³⁵ To describe the psychosocial health impacts of COVID-19 among PLHIV in the United States, the objectives of this study were to assess the extent of social disruptions experienced by PLHIV and at-risk HIV-negative Multicenter AIDS Cohort Study (MACS)/WIHS Combined Cohort Study (MWCCS) participants and determine the impact of these disruptions on psychosocial health. We hypothesized that HIV-positive status was associated with higher rates of COVID-19 prevention behaviors and social and health care disruptions among both men and women and that, overall, social disruption was associated with adverse psychosocial health conditions.

METHODS

Sample

The MWCCS is the largest mixed-serostatus observational cohort study of men and women in the United States. The MACS and WIHS cohorts were combined in 2019,³⁶ comprising 2115 women (3:1 ratio of women living with HIV, or WLHIV, to HIV-seronegative women) and 1901 men

(1:1 ratio of men living with HIV, or MLHIV, to HIV-seronegative men).³⁷ MACS study sites are located in Baltimore, MD/Washington, DC; Chicago, IL; Los Angeles, CA; and Pittsburgh, PA, with satellite sites in San Francisco, CA, and Columbus, OH. WIHS study sites are located in Atlanta, GA, Bronx and Brooklyn, NY; Birmingham, AL/Jackson, MS; Chapel Hill, NC; Chicago, IL, Miami, FL; San Francisco, CA; and Washington, D.C.³⁸ Participants attended semiannual study visits through October 2019, including biopsychosocial data collection. For this study, trained staff from each study site contacted cohort participants between April 8, 2020, and June 30, 2020, through telephone/videoconference and enrolled consenting participants (n = 3411). Study procedures and human subjects research protection protocols were approved by Institutional Review Boards at each site.

Measures

The MWCCS established a group of investigators including National Community Advisory Board representatives to develop a COVID-19 survey assessing the impact of the COVID-19 pandemic on participants. The survey (<https://statepi.jhsph.edu/mwccs/data-collection-forms>) addressed 6 domains: COVID-19 symptoms; SARS-CoV-2 testing and treatment; COVID-19 prevention behavior; tobacco, nicotine, and cannabis use; social and health care disruptions; and psychosocial factors.

COVID-19 Prevention Behaviors

Questions assessed whether participants were: (1) staying home as much as they can; (2) practicing physical distancing by maintaining 6 feet from others when in public spaces; (3) in self-quarantine (not leaving the house at all) because they have symptoms or tested positive for coronavirus; (4) in self-quarantine (not leaving the house at all) because they were in contact with someone who was infected with coronavirus; (5) in self-quarantine (not leaving the house at all) because they are unsure of their infection status; and (6) taking other steps.

COVID-19–Related Social Disruptions

Questions assessed whether the coronavirus pandemic led to any of the following (yes/no): (1) you or a member of your household losing their job, having to stop working, or having to work fewer hours; (2) losing childcare or having to spend more time taking care of children; (3) loss of other sources of financial support, such as food stamps; (4) loss of housing or becoming homeless; and (5) loss of health insurance. Positive responses were summed to express the number of social disruptions due to COVID-19 and trichotomized for analyses (0; 1; or 2 or more social disruptions).

COVID-19–Related Health Care Disruptions

Questions assessed whether “the coronavirus pandemic led to any of the following problems accessing medical care?” Binary responses included being unable to attend an appointment (for reasons including facilities closure, transportation, and telemedicine technology deficiency); being unable to

obtain medications normally taken (including HIV medication); and being unable to afford medical care (including losing health insurance). Additional questions assessed the extent to which the coronavirus pandemic interrupted (1) mental health care and (2) substance use treatment. Response options for these questions used a 3-point Likert scale (not at all/somewhat/a lot).

Abuse

We assessed experiences of abuse by querying participants' experience of "any physical, emotional, or sexual abuse" since January 2020; and, if yes, whether they had "experienced a change (increase or decrease)" in abuse since January. Separate responses were elicited for each of these forms of abuse and for each separate response, whether abuse had increased.

Depression Symptoms

We assessed depression symptomology using the CES-D-10 short form. We used a dichotomous outcome corresponding to depression symptoms (score ≥ 10).³⁹

Loneliness

Loneliness was assessed using the Three-item UCLA Loneliness Scale. We used a dichotomous outcome corresponding to loneliness symptoms (score ≥ 6).^{40,41}

Anxiety

Two items from the 4-item PROMIS Anxiety Short Form 4a⁴² were used: "my worries overwhelmed me" and "I felt uneasy." We used a dichotomous outcome corresponding with participants reporting recent anxiety at least sometimes (score ≥ 6).

Stress

Stress was measured through the 4-item brief Perceived Stress Scale.⁴³ We used a dichotomous cut point (score ≥ 12) to indicate severe stress.⁴⁴

Social Support Network

Social support network was assessed through a one-item validated measure: "Is there someone you can talk to about things that are important to you—someone you can count on for understanding or support?"⁴⁵ Responses included no one; one person; 2–3 people; 4–5 people; and 6 or more people. Based on previous research, responses were dichotomized in multivariable analyses to reflect lower social support (≤ 1 person).⁴⁵

Social Support Satisfaction

We assessed social support satisfaction with the question "In the past month, how satisfied are you with the social support that you have received from others?"⁴⁶ Responses were based on a 5-point Likert scale and dichotomized for logistic regressions to reflect dissatisfaction (3–5) vs. satisfaction (1–2).

Resilient Coping

We used 3 items from the Brief Resilient Coping Scale⁴⁷: "I look for creative ways to alter difficult situations"; "regardless of what happens to me, I believe I can control my reaction to it"; and "I believe I can grow in positive ways by dealing with difficult situations." This resulted in a 15-point scale, recoded to reflect high (13–15), medium (11–12), and low (3–10) resilient coping, commensurate with categorizations from the original 20-point scale.⁴⁷

Covariates

Covariates included age; race/ethnicity; low-income status (men: $< \$20,000$ individually pretax/year; women: $\leq \$18,000$ per household/year); gender; and region (Northeast; Midwest; Mid-Atlantic, South; and West). HIV-positive serostatus was verified through medical records and/or previous onsite HIV antibody and confirmatory testing; HIV-negative serostatus was verified by HIV antibody testing conducted at the most recent in-person study visit.

Statistical Analysis

Using the χ^2 tests for dichotomous variables and Wilcoxon rank sum tests for continuous variables and stratifying by gender, we calculated the prevalence and correlates of COVID-19 prevention behavior, abuse, social and health care disruptions, and psychosocial health by HIV status. Analyzing the overall MWCCS cohort, we conducted bivariate and multivariable logistic regressions to test associations between social disruption and psychosocial health, adjusting for sociodemographics and HIV serostatus. Because bivariate analyses showed significant differences in social disruption by gender and HIV status, multivariable analyses adjusted for gender-by-HIV status interaction. Analyses were performed using SAS 9.4 (SAS Institute, Inc., Cary, NC).

RESULTS

A total of 3411 MWCCS participants completed the baseline COVID-19 survey, including 1586 men (788 MLHIV; 798 HIV-negative) and 1825 women (1290 WLHIV; 535 HIV-negative), reflecting 84.9% of the active combined cohort (Table 1). The mean overall age of participants was 56.6 years (SD: 11.1 yrs). Men were on average older than women (62.8 ± 9.4 years vs 60.8 ± 11.4 years; $P < 0.001$). There were statistically significant differences by HIV status across race/ethnicity categories among men ($P < 0.001$) and women ($P < 0.01$): MLHIV were more likely than HIV-negative men to identify as Black (25.9% vs. 14.6%) and Hispanic/Latinx (17.2% vs. 7.0%); WLHIV were more likely than HIV-negative women to identify as White (10.8% vs. 6.2%). Among men, HIV-negative participants were more likely than MLHIV to report low-income status (33.9% vs. 16.8%; $P < 0.001$); no significant income differences by HIV status were detected among women (61.1% vs. 56.8%; $P = 0.09$).

Most of the respondents reported engaging in COVID-19 prevention behaviors: 97.0% reported staying at home as much as possible, 97.7% staying at least 6 feet apart from

TABLE 1. Associations Between HIV Status, Sociodemographics, and Physical Distancing in the MWCCS, Stratified by Gender

	Prevalence									
	Men (MACS)					Women (WIHS)				
	All (N = 3411)		PLHIV (N = 788)	HIV- (N = 798)	Test Stat (DF)*	P	PLHIV (N = 1290)		HIV- (N = 535)	Test Stat (DF)*
N	%	%	%	%			%			
Date of survey administration (2020)										
April 8–30	791	23.2	6.8	13.3	37.0 (2)	<0.0001	36.1	30.9	4.7 (2)	0.10
May 1–31	2157	63.2	67.9	71.5			56.2	60.9		
June 1–30	463	13.6	25.3	15.2			7.7	8.2		
Age in years: Mean (SD)	56.6	11.1	57.9 (10.90)	63.7 (11.20)	−10.5 (1584)	<0.0001	53.3 (9.19)	51.7 (9.85)	3.40 (1823)	0.001
Race and ethnicity										
White non-Hispanic	1224	35.9	55.1	77.3	90.4 (3)	<0.0001	10.8	6.2	12.0 (3)	0.01
Black non-Hispanic	1637	48.0	25.9	14.6			71.5	73.8		
Hispanic any race	454	13.3	17.2	7.0			14.2	14.8		
Other	96	2.8	1.8	1.1			3.5	5.2		
Annual income										
<\$20,000/year before taxes	400	25.3	33.9	16.8	61.0 (1)	<0.0001	N/A	N/A		
≥\$20,000/year before taxes	1180	74.7	66.1	83.2			N/A	N/A		
≤\$18,000 avg household/year	1091	59.8	N/A	N/A			61.1	56.8	2.8 (1)	0.09
>\$18,000 avg household/year	733	40.2	N/A	N/A			38.9	43.2		
Region of US country										
Northeast (Brooklyn NY, Bronx NY)	524	15.4	N/A	N/A	0.8 (2)	0.68	27.8	31.0	4.5 (4)	0.34
Mid-Atlantic (Washington DC, Baltimore MD)	600	17.6	21.9	23.4			13.0	13.7		
Midwest (Chicago IL, Pittsburgh PA, Columbus OH)	824	24.1	37.7	38.3			11.7	13.1		
West (San Francisco CA, Los Angeles CA)	839	24.6	40.4	38.3			12.0	11.2		
South (Chapel Hill NC, Atlanta GA, Miami FL, Birmingham AL, Jackson MS)	624	18.3	N/A	N/A			35.5	31.0		
Physical distancing behaviors (yes to any):										
Staying home as much as you can?	3309	97.0	95.3	97.0	3.1 (1)	0.08	97.7	97.9	0.1 (1)	0.72
Practicing social distancing by staying 6 feet from others when in a public space?	3332	97.7	97.5	97.1	0.2 (1)	0.67	97.8	98.5	0.9 (1)	0.35
In self-quarantine (not leaving the house at all) [for any of 3 reasons]?	272	8.0	7.0	6.4	0.2 (1)	0.64	8.5	10.5	1.8 (1)	0.19
Taking other steps?	2573	75.4	84.6	85.8	0.5 (1)	0.50	65.7	69.9	3.1 (1)	0.08
Not making any changes to your daily life and routine?	456	13.4	11.4	7.5	7.1 (1)	0.01	16.8	16.6	0.01 (1)	0.92

*The T test for age and χ^2 test for all other factors.

others in public spaces, and 75.4% reported taking other COVID-19 prevention steps. There were no statistically significant differences in COVID-19 prevention behaviors by HIV status.

Table 2 summarizes the prevalence of social and health care disruptions due to COVID-19 and bivariate effects by HIV status, stratified by gender. Overall, 34.8% of respondents reported employment disruption. MLHIV were more likely than HIV-negative men to report employment disruption (36.4% vs. 30.4%; $P = 0.01$), requesting/receiving

unemployment benefits (19.3% vs. 14.3%; $P = 0.01$), and inability to afford basic needs (11.4% vs. 3.7%; $P < 0.001$). These findings were reversed among women, such that WLHIV were less likely than HIV-negative women to report employment disruption (33.0% vs. 43.1%; $P < 0.001$), requesting/receiving unemployment benefits (14.8% vs. 21.1%; $P = 0.001$), and inability to afford basic needs (17.1% vs. 20.9%; $P = 0.05$). Overall, 7.5% of the sample reported losing childcare; this outcome was borne chiefly by women (13.1% of women vs. 1.2% of men), and HIV-

TABLE 2. Associations Between Social/Care Disruptions and HIV Status in the MWCCS, Stratified by Gender

	Prevalence									
	Men (MACS)					Women (WIHS)				
	All (N = 3411)		PLHIV (N = 788)	HIV- (N = 798)	Test Stat (DF)*	P	PLHIV (N = 1290)		HIV- (N = 535)	Test Stat (DF)*
N	%	%	%	%			%			
Social disruption: Has the coronavirus pandemic led to any of the following for you or a member of your household? (yes to any):										
Q1. Losing their job, having to stop working, or having fewer hours?	1184	34.8	36.4	30.4	6.5 (1)	0.01	33.0	43.1	16.6 (1)	<0.0001
Q2. Requested or received unemployment benefits?	570	16.7	19.3	14.3	7.1 (1)	0.01	14.8	21.1	10.72 (1)	0.001
Q3. Losing childcare or having to spend more time taking care of children?	255	7.5	1.3	1.0	0.2 (1)	0.62	10.3	19.6	28.5 (1)	<0.0001
Q4. Loss of other sources of financial support, such as food stamps?	172	5.1	4.9	3.3	2.4 (1)	0.12	5.6	6.8	0.9 (1)	0.34
Q5. Loss of your housing or becoming homeless?	33	1.0	0.8	0.1	N/A	0.07	1.2	1.9	1.1 (1)	0.30
Q66. Loss of your health insurance?	57	1.7	2.3	0.9	5.1 (1)	0.02	1.2	3.0	6.7 (1)	0.01
Q7. Gaining insurance as part of an emergency coverage or Medicaid expansion?	23	0.7	0.8	0.8	0.0005 (1)	0.98	0.3	1.3	N/A	0.02
Q8. Difficulty in paying for basic needs, including food, clothing, shelter, and heat?	451	13.3	11.4	3.7	34.3 (1)	<0.0001	17.1	20.9	3.8 (1)	0.05
Medical care disruption due to COVID (yes to any):										
Q9. Unable to attend a health care provider's appointment?	1171	34.3	32.6	28.6	3.1 (1)	0.08	37.7	37.4	0.02 (1)	0.90
Q10. The health care facility was closed because of the coronavirus pandemic?	935	27.4	23.7	20.4	2.5 (1)	0.11	32.5	31.0	0.4 (1)	0.53
Q11. You had no transportation to get to the health care provider's office?	65	1.9	1.7	0.1	10.5 (1)	0.00	2.8	2.8	0.0002 (1)	0.99
Q12. Your health care provider was seeing patients over the Internet or by phone and you do not have Internet access or a cell phone?	297	8.7	7.1	6.3	0.4 (1)	0.50	10.9	9.4	1.0 (1)	0.32
Q13. Unable to obtain medications that you normally take?	139	4.1	3.9	2.4	3.1 (1)	0.08	4.5	5.8	1.4 (1)	0.23
Q14. Were these your HIV medications?	54	1.6	2.3	N/A	N/A	N/A	2.7	N/A	N/A	N/A
Q15. Unable to afford medical care?	66	1.9	1.5	1.8	0.1 (1)	0.72	1.8	3.2	3.4 (1)	0.06
Q16. Was this because you lost your insurance?	26	0.8	0.5	0.8	N/A	0.75	0.7	1.3	N/A	0.27
How much has the coronavirus pandemic interrupted any of the following:										
Q17. Care you receive for mental health?										
I do not receive mental health care	2444	71.7	74.1	81.7	26.5 (3)	<0.0001	65.3	68.4	3.8 (3)	0.28
Not at all	541	15.9	14.0	11.3			19.2	17.4		
Somewhat	244	7.1	6.2	5.6			8.0	8.8		
A lot	181	5.3	5.7	1.4			7.5	5.4		
Q18. Your substance use treatment?										
I do not receive mental health care	3126	91.7	92.5	95.7	7.6 (3)	0.06	89.3	90.1	5.6 (3)	0.13
Not at all	195	5.7	4.1	2.3			7.7	8.4		

TABLE 2. (Continued) Associations Between Social/Care Disruptions and HIV Status in the MWCCS, Stratified by Gender

	Prevalence									
	Men (MACS)					Women (WIHS)				
	All (N = 3411)		PLHIV (N = 788)	HIV- (N = 798)	Test Stat (DF)*	P	PLHIV (N = 1290)	HIV- (N = 535)	Test Stat (DF)*	P
N	%	%	%	%			%			
Somewhat	50	1.5	1.7	1.0			1.7	1.3		
A lot	39	1.1	1.7	1.0			1.3	0.2		

*The Fisher exact test for Q5 (MACS), Q7 (WIHS), Q16 (MACS & WIHS), the χ^2 test for all other questions.

negative women reported childcare loss at higher rates than WLHIV (19.6% vs. 10.3%; $P < 0.001$). Overall, 5.1% of the sample reported additional losses to financial support, and 1.0% reported losing housing; there were no significant differences in these outcomes by HIV status. As shown in Figure 1, having one or more types of social disruption was most common among HIV-negative women (51.1%), similarly common among MLHIV (40.6%) and WLHIV (39.8%), and least common among HIV-negative men (32.9%) (Fig. 1).

Participants reported substantial health care disruptions due to the COVID-19 pandemic: 34.3% reported being unable to attend a provider appointment, with 27.4% reporting facility closure; 4.1% reporting inability to obtain medications; and 1.9% reporting inability to afford medical care. There were no statistically significant gender-stratified differences in medical care disruption by HIV status. Of participants who reported receiving mental health care ($n = 966$), 44.0% reported care interruptions due to the pandemic. Of participants who reported receiving substance use treatment ($n = 284$), 31.3% reported treatment interruptions.

Table 3 summarizes bivariate, gender-stratified differences by HIV status in experiences of abuse and psychosocial health. Overall, 1.9% reported abuse since January 2020, with 1.1% reporting recent increases in abuse. Substantial proportions of participants had symptoms consistent with depression

(33.2%) and loneliness (29.3%), with WLHIV being less likely than HIV-negative women to report depression symptoms (34.5% vs. 41.9%; $P < 0.001$) or loneliness (27.7% vs. 34.0%; $P = 0.01$). MLHIV were more likely than HIV-negative men to report anxiety (12.4% vs. 8.8%; $P = 0.02$). Anxiety symptoms did not differ between WLHIV and HIV-negative women (18.2% vs. 20.0%, $P = 0.32$). Lower social support network size was reported by 21.7% of participants, and 21.0% reported low resilient coping, with no statistically significant gender-stratified differences by HIV status. Overall, 12.9% of participants reported social support dissatisfaction. MLHIV had higher rates of social support dissatisfaction than HIV-negative men (17.0% vs. 12.7%; $P = 0.02$), whereas WLHIV had lower rates of social support dissatisfaction than HIV-negative women (9.7% vs. 14.8%; $P = 0.002$).

Tables 4 and 5 summarizes results from bivariate and multivariable logistic regressions assessing effects of COVID-19-related social disruption on psychosocial health. In models adjusted for HIV status and sociodemographics, having experienced one social disruption was associated with significantly higher odds of depression symptoms [aOR = 1.32; 95% confidence interval (CI): 1.12 to 1.56]. Participants who experienced ≥ 2 social disruptions had higher adjusted odds of depression symptoms (aOR = 1.85; 95% CI: 1.40 to 2.44), anxiety symptoms (aOR = 1.63; 95% CI: 1.17 to 2.27), and social support dissatisfaction (aOR = 1.81; 95% CI: 1.26 to 2.60), but not higher odds of stress or low social support (Tables 4 and 5).

Differences in multiple psychosocial outcomes were observed by gender with higher odds of negative psychosocial health in women compared with men (Tables 4 and 5). Compared with HIV-negative men (reference), HIV-negative women had higher adjusted odds of depression symptoms (aOR = 1.52; 95% CI: 1.12 to 2.06), anxiety (aOR = 1.97; 95% CI: 1.31 to 2.97), and low resilient coping (aOR = 1.67; 95% CI: 1.17 to 2.37). Compared with HIV-negative men, WLHIV had higher odds of anxiety symptoms (aOR = 1.80; 95% CI: 1.23 to 2.61) and low resilient coping (aOR = 1.43; 95% CI: 1.05 to 1.97). MLHIV did not have significantly higher odds of psychosocial health outcomes than HIV-negative men.

Differences in psychosocial health by race and ethnicity were observed. Odds of low social support were higher among Latinx/Hispanic (aOR = 1.81; 95% CI: 1.34 to 2.44)

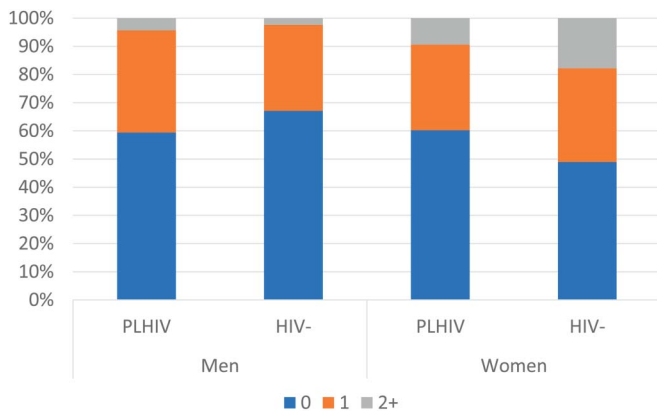


FIGURE 1. Number of social disruptions by gender and HIV status in the MWCCS ($n = 3411$).

TABLE 3. Associations Between Violence Victimization, Psychosocial Characteristics, and HIV Status in the MWCCS, Stratified by Gender

	Prevalence										
	Men (MACS)					Women (WIHS)					
	All (N = 3411)		PLHIV (N = 788)	HIV- (N = 798)	Test Stat (DF)*	P	PLHIV (N = 1290)		HIV- (N = 535)	Test Stat (DF)*	P
	N	%	%	%			%	%			
Any abuse since January (yes to any):											
Physical abuse?	14	0.4	0.6	0.1	N/A	0.12	0.3	0.8	N/A	0.24	
Increase in physical abuse?	8	0.2	0.4	0.1	N/A	0.37	0.1	0.6	N/A	0.08	
Emotional abuse?	46	1.4	1.4	0.9	1.0 (1)	0.33	1.6	1.5	0.01 (1)	0.93	
Increase in emotional abuse?	36	1.1	1.4	0.5	3.4 (1)	0.07	1.1	1.3	0.2 (1)	0.69	
Sexual abuse?	9	0.3	0.1	0.1	N/A	1.00	0.2	0.8	N/A	0.20	
Increase in sexual abuse?	6	0.2	0.1	0.1	N/A	1.00	0.0	0.8	N/A	0.01	
Any physical, emotional, or sexual abuse?	64	1.9	2.2	1.0	3.4 (1)	0.06	2.1	2.2	0.04 (1)	0.84	
Increase in physical, emotional, or sexual abuse?	39	1.1	1.5	0.6	3.0 (1)	0.08	1.1	1.5	0.5 (1)	0.47	
Psychosocial characteristics											
Depressive symptoms (CES-D SF \geq 10)	1126	33.2	29.6	28.5	0.2 (1)	0.63	34.5	41.9	8.8 (1)	0.003	
Loneliness (UCLA loneliness Brief \geq 6)	997	29.3	28.8	29.1	0.01 (1)	0.91	27.7	34.0	7.2 (1)	0.01	
Anxiety (PROMIS Item Bank: Emotional Distress-Anxiety \geq 6)	509	14.9	12.4	8.8	5.5 (1)	0.02	18.2	20.0	0.8 (1)	0.36	
Social support											
Low (0–1 person)	738	21.7	18.6	15.8	2.3 (2)	0.32	25.5	25.4	2.7 (2)	0.26	
Medium (2–3 people)	1395	40.9	41.4	42.8			41.0	37.4			
High (4+ people)	1276	37.4	40.0	41.4			33.5	37.2			
Social support satisfaction											
Neutral, dissatisfied, or very dissatisfied	438	12.9	17.0	12.7	5.8 (1)	0.02	9.7	14.8	9.8 (1)	0.002	
Satisfied or very satisfied	2961	87.1	83.0	87.3			90.3	85.2			
Perceived Stress Scale (PSS-4 \geq 12)	71	2.1	1.5	1.1	0.5 (1)	0.50	2.9	2.4	0.3 (1)	0.60	
Brief Resilient Coping Scale (rescaled for 3 questions)											
Low resilient copers (3–10)	715	21.0	17.9	16.3	1.3 (2)	0.52	23.9	25.6	0.6 (2)	0.73	
Medium resilient copers (11–12)	1169	34.4	31.9	34.3			35.9	34.6			
High resilient copers (13–15)	1517	44.6	50.2	49.4			40.2	39.8			

*The Fisher exact test for physical abuse, increase in physical abuse, sexual abuse, and increase in sexual abuse (MACS and WIHS); the χ^2 test for all other questions/characteristics.

and Black, non-Hispanic (aOR = 1.37; 95% CI: 1.06 to 1.78) participants compared with White, non-Hispanic participants. However, Black, non-Hispanic participants had significantly lower adjusted odds of depression symptoms (aOR = 0.62; 95% CI: 0.50 to 0.77) and stress (aOR = 0.32; 95% CI: 0.17 to 0.62) relative to White, non-Hispanic participants. Compared with higher-income participants, low-income participants had higher adjusted odds of each psychosocial health outcome surveyed, including more than 4 times the odds of reporting stress (aOR = 4.39; 95% CI: 2.40 to 8.01).

DISCUSSION

Our findings demonstrate that in a large US cohort of PLHIV and HIV-negative men and women, substantial social disruptions due to the COVID-19 pandemic and psychosocial health impacts were reported as early as April 2020: more than one-third of the sample reported employment disruption

and medical care disruption, respectively. One-third of the sample reported symptoms consistent with depression, and almost 30% reported characteristics associated with loneliness. Higher levels of social disruption were associated with higher adjusted odds of depression symptoms, anxiety, and social support dissatisfaction, confirming our key hypothesis.

Virtually, the entire cohort reported staying home as much as possible and practicing physical distancing behavior between April and June 2020, potentially due to older age and heightened vigilance learned from surviving the HIV epidemic³⁵ (which includes, among those at risk of HIV, maintaining HIV-negative status). Additional COVID-19 precautions were reported by three-quarters of the cohort. These behaviors may be indicative of resiliencies particular to HIV/AIDS survivors and to participants who have remained HIV-negative despite high levels of social and structural risk. A substantial proportion of participants (44.6%) reported high

TABLE 4. Associations Between Extent of Social Disruptions and Psychosocial Health Outcomes (Loneliness, Depression Symptoms, and Anxiety) in the MWCCS: Results From Bivariate and Multivariate Logistic Regressions

	Loneliness†				Depression Symptoms‡				Anxiety§			
	OR		aOR		OR		aOR		OR		aOR	
Extent of social disruption (0–5)												
0 (ref)	1		1		1		1		1	1	1	1
1	1.04	0.88–1.22	1.07	0.91–1.27	1.31	1.12–1.54	1.32	1.12–1.56	1.14	0.93–1.40	1.11	0.89–1.38
2+	<i>1.31</i>	<i>1.00–1.71</i>	1.29	0.97–1.72	2.02	1.56–2.61	1.85	1.40–2.44	1.95	1.43–2.65	1.63	1.17–2.27
Gender by HIV interaction												
SN men (ref)	1		1		1		1		1	1	1	1
MLHIV	0.99	0.79–1.23	0.88	0.70–1.11	1.06	0.85–1.31	0.89	0.71–1.12	1.47	1.06–2.03	1.18	0.84–1.66
WLHIV	0.94	0.77–1.14	0.76	0.58–1.01	1.32	1.09–1.60	1.13	0.86–1.48	2.30	1.73–3.05	1.80	1.23–2.61
SN women	1.26	0.99–1.59	1.04	0.77–1.42	1.80	1.43–2.27	1.52	1.12–2.06	2.59	1.87–3.58	1.97	1.31–2.97
Age												
Younger than 40	1.01	0.76–1.35	0.94	0.70–1.27	0.95	0.72–1.24	0.84	0.63–1.13	0.77	0.53–1.11	0.75	0.51–1.10
40–49	0.90	0.73–1.13	0.90	0.72–1.13	<i>0.82</i>	<i>0.66–1.00</i>	0.75	0.60–0.93	1.00	0.78–1.30	0.93	0.71–1.22
50–59 (ref)	1		1		1		1		1	1	1	1
60–69	0.92	0.76–1.11	0.93	0.76–1.13	0.72	0.60–0.86	0.74	0.61–0.89	0.65	0.51–0.83	0.75	0.58–0.96
70+	0.88	0.69–1.14	0.93	0.70–1.24	0.48	0.37–0.63	0.54	0.40–0.72	0.32	0.21–0.49	0.47	0.30–0.75
Race/ethnicity												
Black non-Hispanic	1.03	0.87–1.21	0.84	0.67–1.05	1.09	0.93–1.28	0.62	0.50–0.77	1.60	1.28–2.00	0.82	0.61–1.10
Hispanic any race	1.06	0.84–1.34	0.90	0.68–1.18	1.27	1.01–1.59	0.79	0.61–1.03	1.68	1.24–2.28	0.92	0.65–1.30
White non-Hispanic (REF)	1		1		1		1		1	1	1	1
Other	1.07	0.68–1.68	0.93	0.58–1.51	1.75	1.15–2.67	1.05	0.67–1.66	3.17	1.96–5.13	1.80	1.07–3.04
Income												
Low (MACS: <\$20,000/year; WIHS: \$18,000/year or less)	1.66	1.43–1.93	1.84	1.56–2.18	1.64	1.42–1.89	1.68	1.43–1.98	1.97	1.63–2.39	1.72	1.39–2.13
Higher (MACS: \$20,000/year or more; WIHS: >\$18,000/year) (ref)	1		1		1		1		1	1	1	1
Region*												
Northeast/Mid-Atlantic (REF)	1		1		1		1		1	1	1	1
Midwest	1.12	0.94–1.35	1.10	0.89–1.36	0.91	0.76–1.08	1.01	0.82–1.24	0.83	0.66–1.04	1.20	0.91–1.59
West Coast	1.42	1.12–1.80	1.43	1.12–1.82	1.30	1.03–1.63	1.34	1.06–1.70	0.94	0.69–1.28	1.02	0.74–1.41
South	1.25	1.01–1.55	1.17	0.92–1.48	<i>1.23</i>	<i>1.00–1.51</i>	1.03	0.82–1.31	1.15	0.89–1.50	0.88	0.66–1.17

Bolded values indicate significant odds ratios ($P < 0.05$).

*Northeast/Mid-Atlantic: Brooklyn NY, Bronx NY, Washington DC, Baltimore MD; Midwest: Chicago IL, Pittsburgh PA, Columbus OH; West Coast: San Francisco CA, Los Angeles CA; South: Chapel Hill NC, Atlanta GA, Miami FL, Birmingham AL, Jackson MS

†UCLA Loneliness Brief Form (3 questions; range 3–9) score ≥ 6 .

‡CES-D Short Form (10 questions; range 0–30) score ≥ 10 .

§PROMIS Item Bank: Emotional Distress-Anxiety (2 questions; range 2–8) score ≥ 6 .

levels of resilient coping. Previous research with the MACS cohort demonstrates that resiliencies found among aging sexual minority men are protective against loneliness, depression, and negative self-appraisals and support wellness activities such as fitness engagement.^{48,49} Although the COVID-19 prevention strategies reported by participants helped them to lower their SARS-CoV-2 infection risks, they may be associated with an array of profound social disruptions that are in turn linked with adverse psychosocial health sequelae. Our results, demonstrating that a third of the cohort experienced depression symptoms during the COVID-19

pandemic, are consistent with recent findings with the greater US populace.²⁹ The prevalence of depression symptoms among COVID-19 survey respondents was 5% higher than that among cohort participants during the most recent previous survey (2018/2019), suggesting that the pandemic may have led to an increase in depression symptoms.³⁷ Our findings that more than 40% of MWCCS participants had experienced at least one major COVID-19–related social disruption by June 2020 is consistent with emerging literature suggesting that the COVID-19 pandemic had rapid impacts on employment and financial security.^{25–27} In the MWCCS,

TABLE 5. Associations Between Extent of Social Disruptions and Psychosocial Health Outcomes (Stress, Social Support, Social Support Satisfaction, and Resilient Coping) in the MWCCS: Results From Bivariate and Multivariate Logistic Regressions

	Stress				Low Social Support†			
	OR		aOR		OR		aOR	
Extent of social disruption (0–5)								
0 (ref)	1	1	1	1	1	1	1	1
1	1.25	0.74–2.10	1.20	0.70–2.06	1.10	0.92–1.31	1.11	0.92–1.35
2+	2.37	1.19–4.71	1.82	0.87–3.81	1.59	1.20–2.11	1.32	0.97–1.79
Gender by HIV interaction								
SN men (REF)	1	1	1	1	1	1	1	1
MLHIV	1.35	0.57–3.22	0.88	0.36–2.18	1.22	0.94–1.59	1.09	0.83–1.45
WLHIV	2.58	1.24–5.38	1.84	0.71–4.76	1.83	1.45–2.29	1.24	0.90–1.71
SN women	2.17	0.92–5.12	1.55	0.54–4.45	1.82	1.38–2.38	1.24	0.87–1.77
Age								
Younger than 40	1.10	0.50–2.43	0.95	0.41–2.20	1.34	1.00–1.80	1.07	0.78–1.47
40–49	1.02	0.55–1.88	0.87	0.46–1.66	0.94	0.74–1.19	0.83	0.64–1.06
50–59 (ref)	1	1	1	1	1	1	1	1
60–69	0.54	0.29–1.02	0.56	0.29–1.09	0.70	0.57–0.87	0.90	0.72–1.13
70+	0.18	0.04–0.77	0.25	0.06–1.13	0.90	0.69–1.19	1.69	1.23–2.33
Race/ethnicity								
Black non-Hispanic	1.04	0.61–1.79	0.32	0.17–0.62	1.80	1.48–2.17	1.37	1.05–1.78
Hispanic any race	1.30	0.63–2.68	0.54	0.24–1.19	2.03	1.57–2.63	1.81	1.34–2.44
White non-Hispanic (REF)	1	1	1	1	1	1	1	1
Other	2.86	1.06–7.71	1.14	0.38–3.42	2.05	1.27–3.30	2.04	1.22–3.42
Income								
Low (MACS: <\$20,000/year; WIHS: \$18,000/year or less)	4.19	2.42–7.25	4.39	2.40–8.01	1.96	1.66–2.31	1.64	1.36–1.97
Higher (MACS: \$20,000/year or more; WIHS: >\$18,000/year) (ref)	1	1	1	1	1	1	1	1
Region*								
Northeast/Mid-Atlantic (REF)	1	1	1	1	1	1	1	1
Midwest	1.72	0.85–3.49	2.33	1.04–5.23	1.13	0.92–1.39	1.43	1.12–1.82
West Coast	3.16	1.47–6.81	3.20	1.44–7.09	1.10	0.83–1.45	1.20	0.90–1.60
South	3.38	1.66–6.88	2.24	1.05–4.76	2.28	1.82–2.86	2.01	1.57–2.57
Low Social Support Satisfaction‡								
Low Resilient Coping§								
Extent of social disruption (0–5)								
0 (ref)	1	1	1	1	1	1	1	1
1	1.25	1.01–1.56	1.22	0.97–1.53	0.87	0.73–1.05	0.89	0.73–1.07
2+	1.82	1.30–2.54	1.81	1.26–2.60	0.99	0.73–1.35	0.85	0.61–1.17
Gender by HIV interaction								
SN men (REF)	1	1	1	1	1	1	1	1
MLHIV	1.41	1.06–1.86	1.24	0.92–1.67	1.12	0.86–1.46	1.05	0.80–1.39
WLHIV	0.74	0.56–0.97	0.70	0.47–1.02	1.61	1.28–2.03	1.43	1.05–1.97
SN women	1.19	0.87–1.63	1.12	0.74–1.70	1.77	1.35–2.32	1.67	1.17–2.37
Age								
Younger than 40	1.27	0.88–1.84	1.07	0.73–1.59	0.86	0.63–1.18	0.81	0.58–1.13
40–49	1.05	0.78–1.41	1.03	0.76–1.40	0.73	0.57–0.93	0.70	0.55–0.90
50–59 (ref)	1	1	1	1	1	1	1	1
60–69	0.91	0.70–1.17	0.84	0.64–1.11	0.65	0.53–0.80	0.74	0.59–0.92
70+	1.00	0.71–1.41	0.95	0.64–1.40	0.68	0.51–0.91	0.94	0.68–1.30
Race/ethnicity								

TABLE 5. (Continued) Associations Between Extent of Social Disruptions and Psychosocial Health Outcomes (Stress, Social Support, Social Support Satisfaction, and Resilient Coping) in the MWCCS: Results From Bivariate and Multivariate Logistic Regressions

	Low Social Support Satisfaction†				Low Resilient Coping§			
	OR	aOR	OR	aOR	OR	aOR	OR	aOR
Black non-Hispanic	0.78	0.62-0.97	0.74	0.55-1.00	1.50	1.24-1.81	1.06	0.82-1.37
Hispanic any race	0.94	0.69-1.29	0.82	0.57-1.17	1.42	1.09-1.85	1.15	0.85-1.56
White non-Hispanic (REF)	1	1	1	1	1	1	1	1
Other	1.20	0.69-2.11	1.22	0.66-2.23	1.37	0.82-2.27	1.18	0.69-2.02
Income								
Low (MACS: <\$20,000/year; WIHS: \$18,000/year or less)	1.52	1.24-1.86	1.93	1.53-2.43	1.71	1.45-2.02	1.45	1.20-1.74
Higher (MACS: \$20,000/year or more; WIHS: >\$18,000/year) (ref)	1	1	1	1	1	1	1	1
Region*								
Northeast/Mid-Atlantic (REF)	1	1	1	1	1	1	1	1
Midwest	2.31	1.77-3.02	2.06	1.52-2.81	1.11	0.91-1.37	1.47	1.15-1.87
West Coast	2.33	1.67-3.25	2.18	1.55-3.08	1.25	0.95-1.63	1.39	1.05-1.83
South	1.85	1.34-2.54	1.77	1.25-2.51	1.70	1.35-2.15	1.48	1.15-1.91

Bolded values indicate significant odds ratios (P < 0.05).

*Northeast/Mid-Atlantic: Brooklyn NY, Bronx NY, Washington DC, Baltimore MD; Midwest: Chicago IL, Pittsburgh PA, Columbus OH; West Coast: San Francisco CA, Los Angeles CA; South: Chapel Hill NC, Atlanta GA, Miami FL, Birmingham AL, Jackson MS

†Level of social support in the past month was low (0-1 people).

‡Satisfaction with social support received in the past month was low (not satisfied, including neutral).

§Brief Resilient Coping Scale (3 questions; range 3-15) score <11 (low resilient copier).

||Perceived Stress Scale (range 0-16) score greater than or equal to 12.

low-income participants were at particular risk for adverse psychosocial health outcomes, including 4 times higher odds of experiencing stress.

By providing context within a large observational mixed-serostatus cohort, our findings add to the emerging literature on the psychosocial impact of pandemic-related disruptions in the context of HIV disease and those at-risk of HIV infection. The response rate of active cohort participants to baseline COVID-19 survey questions was high (84.9%) and likely reflects the uniquely long-standing nature of this observational cohort study, in which many participants have been attending semiannual visits for 30 years or more and are deeply committed to their participation and to the scientific advancements that have ensued as a result.³⁷ We initially hypothesized that HIV-positive status would be associated with higher rates of social and health care disruptions among both men and women. Among men, this hypothesis was generally confirmed: MLHIV were more likely than HIV-negative men to report employment and financial disruptions. However, the opposite effect was seen among women: although women in general reported higher rates of social disruption than men, WLHIV were generally less likely to report employment and financial disruptions compared with HIV-negative women. Because the WIHS participants are representative of the HIV epidemic among US women, the cohort includes a high proportion of Black women of low socioeconomic status, including in the South, in states (Alabama, Mississippi, Georgia, North Carolina, and Florida) where Medicaid expansion has not been adopted.⁵⁰ As a result, women participants have less financial resilience and

medical and social service resources available to them than men participants, who are relatively getting higher income, better educated, less racially diverse (and thus, as a whole, less subject to issues of systemic racism), and not located in the South. In addition, some PLHIV receive social services, including disability benefits, housing opportunities, health insurance, and prescription drug coverage, for which HIV-negative individuals at the same income levels may not qualify. This may explain the higher rates of social disruptions and consequent psychosocial disparities we found among HIV-negative women, who in this sample are the most socioeconomically disadvantaged of the groups studied.

Black, non-Hispanic participants had lower odds for depression and stress in adjusted analyses, which also controlled for level of income. Because level of income seemed to be the strongest predictor in our analyses for adverse psychosocial health outcomes and given the poor socioeconomic status of our primarily Black women participants, structural interventions alleviating financial stressors may be most effective in lessening the impact of financially based social disruptions.

This study contains several important limitations: first, although the MWCCS is a large, mixed-gender, mixed-serostatus cohort comprising 13 sites across the country, it is not a nationally representative sample. Recruitment procedures have been convenience-based and not probabilistic,^{38,51,52} and socio-demographic differences between men and women in this sample are substantial. Income was assessed differently in MACS and WIHS participants at last visit, complicating gender comparisons. Because employment disruption characterized only one form of

potential social disruption analyzed here, we did not account for employment, disability, and/or retirement status from preceding visits; previous findings from the MACS sample have shown lower odds of depression symptoms among retirees, and this effect may be more pronounced given pandemic-related employment disruptions.⁵³ Although pilot-testing, face validity, and stakeholder involvement procedures were conducted before survey deployment, the instrument was developed in rapid response to the pandemic, limiting the opportunity to fully test and refine newly created measures, including those related to COVID-19 prevention behaviors and social disruptions. Certain measures based on existing scales (PROMIS Anxiety Short Form 4a; Brief Resilient Coping Scale) were truncated to reduce participant burden and facilitate rapid deployment; psychometric properties of these reduced scales have not been assessed, restricting our ability to confirm the reliability, validity, and clinical utility of cutoffs used. The MACS sample is comprised almost entirely of sexual minority men, and the WIHS sample is composed of almost entirely sexual majority women,³⁷ limiting our ability to conduct either cohort-stratified (because of limited variance) or combined cohort (because of multicollinearity with the gender/HIV status interaction covariate) analyses that might otherwise assess pandemic-associated differences in psychosocial health by sexual and gender minority status. Because this study was cross-sectional, we cannot verify causal pathways between social disruption and psychosocial health outcomes.

Our results indicate that MWCCS participants, who represent populations at greater risk of COVID-19 severity due to comorbidity burden and older age, rapidly undertook prevention behaviors to reduce their SARS-CoV-2 infection risks. As a likely consequence of prevention response, participants experienced COVID-19–related social disruptions and associated psychosocial health symptomology. There is a strong need for further research across several areas. First, it is critical to examine longitudinal trajectories of prepandemic and continuing psychosocial outcomes and social disruptions over time to establish temporal effects, explore within-person and between-group differences, and assess persistence of disruptions and associated psychosocial outcomes. Second, it is necessary to examine COVID-19 prevention behaviors over time, especially in high-risk cohorts such as MWCCS, to explore prevention fatigue and heightened SARS-CoV-2 infection risk. Third, it is necessary to assess whether health care disruptions, common in the first pandemic surge, persist; such disruptions have potential to lead to poorer outcomes across HIV and comorbidity care continua, especially among racial/ethnic minority PLHIV.^{54–56} Finally, to develop meaningful interventions that will remediate pandemic-associated adverse psychosocial health outcomes, it is essential to advocate for federal-level and state-level structural interventions (eg, stimulus checks, extended unemployment benefits, and universal health care). We also recommend research to identify resiliencies developed within vulnerable communities, test the potential moderation of the relationships between social disruption and psychosocial health, and pilot interventions informed by strengths-based frameworks.

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