

Changes in Depression Levels for U.S. Rural Communities Before and After the Start of the COVID-19 Pandemic

Clare E. B. Cannon^{1, 2}, Regardt Ferreira^{2, 3}, Fredrick Buttell^{2, 3}, and Chase Anderson³

¹ Department of Human Ecology, University of California, Davis

² Department of Social Work, University of the Free State, Bloemfontein

³ Tulane University School of Social Work

The objective of this research is to identify whether there were statistically significant changes in depression severity for rural residents in the United States before the COVID-19 pandemic and after its start in 2020. This study uses paired-sample *t* tests to differentiate between depression levels, measured by the Patient Health Questionnaire-9, before the pandemic and after its start for a sample of rural residents ($n = 324$), as well as a subsample of women ($n = 224$) and Black clients ($n = 55$). Results indicate that the average Patient Health Questionnaire-9 decreased from 11.86 to 11.77 for the total sample and from 12 to 11.99 for the subsample of women, whereas the subsample of Black residents increased from 10.58 to 11.27 for prepandemic versus postpandemic levels, though the differences are not statistically significant. Given the urban/rural differences in coping with challenges stemming from the COVID-19 pandemic, the United States cannot have a one-size-fits-all pandemic response policy.

Keywords: disaster, depression, PHQ-9, rural, COVID-19

Disasters, including infectious disease disasters (i.e., SARS and COVID-19), have been linked to increased rates of depression across the United States (Vahratian et al., 2021). Disaster is defined as a serious disruption to a community's functioning with human, economic, social, and environmental impacts (United Nations Office for Disaster Risk Reduction, 2022). Prior to the COVID-19 pandemic research estimates one in six U.S. adults experience depression in their lifetime (Brody et al., 2018). Depression experiences can be particularly difficult as they have been shown to increase comorbidities such as anxiety, musculoskeletal pain, and cardiovascular disease (Zhang et al., 2018).

Though little research has focused on the relationship between disaster, specifically infectious disease disaster, and depression in rural communities (Summers-Gabr, 2020), the research that exists has investigated the relationship between depression and disaster focusing on associated factors such as resource loss, suicidal ideation, and social support (Sattler et al., 2018; Wagenaar et al., 2012). Yet, the relationship between demographic factors and depression rates before and during the COVID-19 pandemic in rural communities remains elusive.

More generally, it is not well understood whether there are higher rates of depression in U.S. rural communities compared

with urban areas—with some research that finds depression may be slightly higher in rural areas (Brossart et al., 2013; Gamm et al., 2010). What is clear is that approximately 20% of U.S. rural residents suffer from experiences of depression (Substance Abuse and Mental Health Services Administration, 2018). Depression prevalence may vary across different sociodemographic groups (Tang et al., 2014). For instance, some research suggests that women, generally, may be more likely than men to report experiences of depression (Brossart et al., 2013), while some from racial minorities experience higher levels of depression compared with their White peers (Bailey et al., 2019). Rural residents experience a resource gap in medical services, generally, and mental health services, specifically, with two major consequences of this including poor access to health care and the limited availability of mental health providers (Summers-Gabr, 2020). This resource gap is further exacerbated during disasters, further widening already existing mental health disparities for rural communities.

In summary, it is not well understood how the COVID-19 pandemic, an infectious disease disaster, has impacted depression rates in rural U.S. communities and how these impacts may differ across gender and racial categories. To address this gap in knowledge, the current study investigated differences in depression rates pre-COVID-19 pandemic (i.e., 2019) and during the first year of the pandemic in the United States (i.e., 2020) for a sample of rural residents seeking care from a Federally Qualified Health Center (FQHC). FQHCs are community-based health centers that provide services to areas with limited resources on a sliding scale that is tied to household income and/or a client's lack of insurance.

Data and Method

This study used deidentified data from FQHC clinics serving contiguous rural communities that span North-East Texas, North-

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Clare E. B. Cannon  <https://orcid.org/0000-0002-5507-5312>

Correspondence concerning this article should be addressed to Clare E. B. Cannon, Department of Human Ecology, University of California, Davis, 1 Shields Avenue, Davis, CA 95616, United States. Email: cebcanon@ucdavis.edu

West Louisiana, and South-West Arkansas. The Tulane University sociobehavioral institutional review board approved this study. Data consisted of all documented visits of individuals throughout 2019 and 2020 for which data were available for both years ($n = 324$). Specifically, this study used the Patient Health Questionnaire-9 (PHQ-9), a well-validated measure for assessing depression which is often categorized into mild (scores between 5 and 9), moderate (10–14), moderately severe (15–19), and severe (20–27; [Cos-tantini et al., 2021](#); [Levis et al., 2019](#)), and demographic variables (e.g., gender and race) to advance our understanding of the effect of the pandemic on depression for a rural sample of residents. The PHQ-9 was administered to clients and demographic measures were collected as part of the intake process for the FQHC. A series of paired sample t tests were conducted to determine differences between depression scores before the COVID-19 pandemic and during the first year of the pandemic for the entire sample and within subpopulations, including across gender and racial categories.

Results

Descriptive Statistics of the Sample

Descriptive statistics for the sample are presented in [Table 1](#). The sample of 324 clients had a mean age of 39.97 years ($SD = 19.44$), with 72.2% identifying as women ($n = 234$), 24.7% as men ($n = 80$), and 0.9% as other ($n = 3$). The majority of clients in the sample identified as White (80.9%; $n = 262$), with 17% identifying as Black ($n = 55$), 1.2% as Asian ($n = 4$), and 0.6% as other ($n = 2$). Regarding ethnicity, 3.7% ($n = 12$) identified as Hispanic/Latino. Of the sample, 99.4% reported speaking English as a first language ($n = 322$). Of the sample, 1.2% identified as veterans ($n = 4$). Regarding public housing, 1.2% ($n = 4$) of the sample were making use of public housing. Among the sample, 0.3% reported homelessness ($n = 1$). Regarding the PHQ-9 prepandemic, the total sample of respondents had a mean score of 11.86 ($SD = 6.7$) for the nine-item questionnaire, which falls in the moderate range for depression severity. Regarding the PHQ-9 during the pandemic, the mean score was 11.77 ($SD = 7.1$), which also falls in the moderate range for depression severity.

The subsample of women consisted of 224 clients from the total sample. The subsample had a mean age of 42.64 years ($SD = 18.98$). Among this subsample, the majority identified as White (80.8%; $n = 189$), with 16.7% identifying as Black ($n = 39$), 1.3% as Asian ($n = 3$), and 0.9% as other ($n = 2$). Among this subsample, 3.4% identified their ethnicity as Hispanic/Latino ($n = 8$) and 95.7% identified as non-Hispanic/Latino ($n = 224$). The vast majority of the subsample reported using English as their first language (99.1%; $n = 232$). Regarding veteran status, 99.1% identified as nonveterans ($n = 232$). Among the subsample, 98.3% identified not living in public housing ($n = 230$). Among the subsample 99.6% identified as not being homeless ($n = 233$). The mean PHQ-9 score prepandemic for the subsample of women was 12.12 ($SD = 6.82$) with the mean PHQ-9 score during the pandemic was 11.99 ($SD = 7.06$).

The subsample of Black clients consisted of 55 clients from the total sample. The subsample has a mean age of 38.49 years ($SD = 17.94$). Among this subsample, 98.2% identified as non-Hispanic/Latino ($n = 54$). All of the clients in the subsample identified

English as their first language ($n = 55$). Of the subsample, 1.8% reported veteran status ($n = 1$). Among the subsample, 94.5% identified not living in public housing ($n = 52$). None of the subsample reported homelessness ($n = 55$). The mean PHQ-9 score prepandemic for the subsample of Black clients was 10.58 ($SD = 5.94$) with the mean PHQ-9 score during the pandemic was 11.27 ($SD = 6.9$).

Differences in PHQ-9 Before and During the COVID-19 Pandemic

A paired sample t test was conducted to determine whether there was a statistically significant difference in PHQ-9 scores before the COVID-19 pandemic and after it started (i.e., 2020; $n = 324$). The pandemic did not identify statistically significant changes in PHQ-9 scores at the two timepoints, $t(323) = .23$, $p = .41$, with PHQ-9 scores decreasing from prepandemic ($M = 11.86$, $SD = 6.7$) to postpandemic ($M = 11.77$, $SD = 7.09$).

Differences in PHQ-9 Before and During the COVID-19 Pandemic for Subsample of Women

A paired sample t test was conducted to determine whether there was a statistically significant difference in PHQ-9 scores before the COVID-19 pandemic and after it started (i.e., 2020) for the subsample of women ($n = 234$). The pandemic did not elicit statistically significant changes in the PHQ-9 over time, $t(233) = .28$, $p = .39$, with PHQ-9 scores decreasing from prepandemic ($M = 12.12$, $SD = 6.782$) to postpandemic ($M = 11.99$, $SD = 7.06$).

Differences in PHQ-9 Before and During the COVID-19 Pandemic for Subsample of Black Clients

A paired-samples t test was conducted to determine whether there was a statistically significant difference in PHQ-9 scores before the COVID-19 pandemic and after it started (i.e., 2020) for the subsample of Black clients ($n = 55$). The pandemic did not elicit statistically significant changes in the PHQ-9 over time, $t(54) = -.85$, $p = .2$, with PHQ-9 scores increasing from prepandemic ($M = 10.58$, $SD = 5.94$) to postpandemic ($M = 11.27$, $SD = 6.9$).

Limitations

There are several limitations to the current research. The data is cross-sectional and represents those that visited a FQHC limiting the generalizability of the study. Although data such as these are an important first step in identifying changes in depression before and during the first year of the COVID-19 pandemic for a rural population, the sample was not representative, limiting the generalizability of the findings. Pair sample t tests cannot determine what factors potentially contributed to any changes in PHQ-9 scores between administrations. Rather, they can only indicate if the change was statistically significant.

Discussion

This research contributes to our understanding of depression in rural communities during the COVID-19 pandemic. The findings

Table 1
Demographic Characteristics of the Sample

Characteristic (coded value)	Total sample of clients (<i>n</i> = 324)		
	Mean/%	<i>n</i> range	<i>SD</i>
Age (in years)	39.97	12–84	19.44
Gender			
Women	72.2	234	
Men	24.7	80	
Other	0.9	3	
Race			
White	80.9	262	
Black	17	55	
Asian	1.2	4	
Other	0.6	2	
Ethnicity			
Hispanic/Latino	3.7	12	
Non-Hispanic/Latino	95.1	308	
Did not disclose	1.2	4	
English second language			
Yes	3	1	
No	322	99.4	
Veteran status			
Yes (1)	1.2	4	
No (2)	98.8	320	
Public housing			
Yes (1)	1.2	4	
No (2)	98.8	320	
Homeless status			
Yes (1)	.3	1	
No (2)	99.7	323	
PHQ-9 mean score prepandemic	11.86		6.7
PHQ-9 mean score during pandemic	11.77		7.1
Subsample of women clients (<i>n</i> = 224)			
Age (in years)	42.64	12–84	18.98
Race			
White	80.8	189	
Black	16.7	39	
Asian	1.3	3	
Other	0.9	2	
Ethnicity			
Hispanic/Latino	3.4	8	
Not Hispanic/Latino	95.7	224	
Did not disclose	0.9	2	
English as second language			
Yes	0.4	1	
No	232	99.1	
Veteran status			
Yes	0.9	2	
No	99.1	232	
Public housing status			
Yes	1.7	4	
No	98.3	230	
Homeless status			
Yes	0.4	1	
No	99.6	233	
Mean PHQ-9 prepandemic	12.12		6.82
Mean PHQ-9 during pandemic	11.99		7.06
Subsample of Black clients (<i>n</i> = 55)			
Age (in years)	38.49	12–76	17.93
Ethnicity			
Hispanic/Latino	0	0	
Not Hispanic/Latino	98.2	54	
Did not disclose	1.8	1	
English as second language			
Yes	0	0	
No	55	100	

Characteristic (coded value)	Subsample of Black clients (<i>n</i> = 55)		
	Mean/%	<i>n</i> range	<i>SD</i>
Veteran status			
Yes	1.8	1	
No	98.2	54	
Public housing status			
Yes	5.5	3	
No	94.5	52	
Homeless status			
Yes	0	0	
No	100	55	
Mean PHQ-9 prepandemic	10.58		5.94
Mean PHQ-9 during pandemic	11.27		6.9

Note. PHQ-9 = Patient Health Questionnaire-9.

suggest that for a rural sample of indigent residents the average level of depression decreased after the start of the pandemic. When we delve deeper, we find that this decrease was reported less frequently among women. Importantly, we find the opposite is true for Black clients in the sample, whose average depression level increased after the start of the pandemic. Our findings suggest there may be within-group differences for rural residents regarding gender and race. It is necessary to interpret these findings cautiously since the statistical tests we conducted did not prove significant. We interpret these findings to mean that it is possible that the COVID-19 pandemic may not have had a major effect on depression levels in rural areas due to the slower spread of the virus outside of urban areas in 2020 (Huang et al., 2021) and the lack of concern many in rural areas expressed about contracting the virus as evidenced by the low vaccination rates in rural areas generally, and in the area where the data were drawn specifically (U.S. Centers for Disease Control and Prevention, 2022).

Given the urban/rural differences in coping with challenges stemming from the COVID-19 pandemic, the United States should not have a one-size-fits-all pandemic response policy. Rather, federal and local policy must be responsive to the differing needs of its residents, including considerations of vaccine access, interest in receiving a vaccine and different kinds of mental health interventions. As this study suggests, depression was already a problem before the pandemic began in rural communities in the United States. Considering these findings, taken together with other research that has found severe economic impacts on rural areas due to the pandemic (Cacari Stone et al., 2021; Mueller et al., 2021) response and recovery policies must seek to reduce mental health inequities in rural communities, rather than seek to return these communities to their prepandemic depression status.

Conclusion

The COVID-19 pandemic continues to impact U.S. communities. Such impacts for rural communities have not been well understood since the pandemic started in the United States in 2020. This research, taken together with previous research into the pandemic's impacts on rural communities, can inform federal and local response and recovery policies that should aim to reduce already present mental health disparities for rural communities.

Doing so will necessitate policy strategies targeted for and responsive to the needs of rural residents.

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