



Associations Between Primary Residence and Mental Health in Global Marginalized Populations

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Abstract

Scholars suggest that marginalized people in non-urban areas experience higher distress levels and fewer psychosocial resources than in urban areas. Researchers have yet to test whether precise proximity to urban centers is associated with mental health for marginalized populations. We recruited 1733 people who reported living in 45 different countries. Participants entered their home locations and completed measures of anxiety, depression, social support, and resilience. Regression and thematic analyses were used to determine what role distance from legislative and urban centers may play in mental health when marginalized people were disaggregated. Greater distance from legislative center predicted higher anxiety and resilience. Greater distance from urban center also predicted more resilience. Thematic analyses yielded five categories (e.g., safety, connection) that further illustrated the impact of geographic location on health. Implications for community mental health are discussed including the need to better understand and further expand resilience in rural areas.

Keywords Resilience · Distress · Location · Minority · Mental health

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Introduction

Mental health disorders (MHDs), such as clinical anxiety and depression, are an important international issue (World Health Organization [WHO], 2021). The global prevalence of MHDs increased substantially in the past three decades, from an estimated 650 million cases in 1990 to approximately one billion (Institute for Health Metrics & Evaluation, 2021). MHDs are very costly and more than \$225 billion U.S. dollars were spent on mental health care in 2019 in the U.S. alone (Open Minds, 2020). Moreover, researchers have identified worsening trends in MHDs worldwide during the COVID-19 pandemic (Wang et al., 2020), further highlighting the need to investigate global contributors to and protective factors against MHDs.

Marginalization and Mental Health

Marginalization and discrimination impose limitations on physical, mental, and behavioral functioning, thereby contributing to the formation and intensification of MHDs (Pascoe & Richman, 2009). Marginalization disadvantages people with stigmatized identities (e.g., LGBTQ+ people, single mothers, adults who are unemployed, and so on) at systemic and interpersonal levels, exposing them to challenges such as victimization and oppression (Bailey et al., 2021). Discrimination is a process by which some people are treated as inferior based on their identities, life experiences, or because of a combination of the two (Pascoe & Richman, 2009). Minoritized people report elevated rates of victimization and discrimination relative to people with privileged identities and as a result, they also report higher rates of illness (e.g., Flores et al., 2020). For example, a transgender young woman who is disowned by her family and rejected by her coworkers is likely to experience depression, anxiety, and other health related issues as a result. Some marginalized identities and experiences, such as being larger bodied, are becoming more universally stigmatized whereas other identities/experiences such as discrimination based on race may depend on the country or area in which a person lives (Brewis et al., 2011).

Scholars suggest that the impact of marginalization on mental health is mediated by resilience (e.g., Matsuno & Israel, 2018). Studies conducted in diverse populations have identified sets of psychological and environmental characteristics that increase individuals' abilities to resist distress (Meyer, 2015). For example, researchers have demonstrated a strong link between life satisfaction (an outcome of resilience) and mental health in a variety of countries and populations and they note that as life satisfaction increases, mental distress tends to decrease (e.g.,

Lombardo et al., 2018). Social support is also a well-established source of resilience for minoritized communities such as Black women and researchers continue to explore ways to leverage social support as a way to improve health in marginalized populations (Harvey et al., 2016). In other words, resilience, social support, and life satisfaction, collectively referred to as psychosocial resources in this paper, work to counteract the impact of marginalization, discrimination, and adversity.

Residence and Health

Place of residence is important to consider when researching health among minoritized populations on a global scale and it is increasingly becoming a focus for psychologists (e.g., Jokela et al., 2015). Many scholars suggest that non-urban areas expose minoritized people to obstacles and experiences that cause distress (Rosenkrantz et al., 2017). For example, discriminatory attitudes are believed to be higher in non-urban settings (Sinnard et al., 2016).

There are two types of urban centers that may play a role in health, size-dominant centers and legislative centers. The largest urban center in a region (because of its size, the effects of growth, and infrastructure) is likely to generate and maintain more products, services, and opportunities (e.g., Glaeser, 2010) than other large cities that fall within the same country or region. As a special type of urban center, legislative centers have the power to pass majority-focused policies, inflame identity-based divisions, and to focus resources on urban spaces.

Distance and Health

Scholars note that common barriers to care in areas distant from urban centers, such as reduced privacy and confidentiality, increased stigma for diverse health care consumers (Harowski et al., 2006). Researchers have identified several risk factors, like smoking and diet, that uniquely impact non-urban populations and interact with non-urban health care issues like reduced health care access and use (Warren et al., 2016). However, other researchers have failed to detect statistically significant health differences between non-urban and urban populations (e.g., Farmer et al., 2016). Failures to detect differences may result from the use of government sanctioned sampling techniques that organize participants into overly broad categories (e.g., census tracts, Metropolitan Statistical Areas) that were never designed to capture nuances in psychosocial and mental health experiences. The variability in these findings suggests a need for further research.

Researchers of resilience in non-urban communities have also identified ways that people in remote communities maintain stability during social-ecological disturbances (see

Gardner & Dekens, 2007). Variables such as social capital or shared values and resources have been identified as benefits of rural residence (Wang et al., 2022). International studies suggest that some minoritized people in non-urban areas enjoy high levels of belongingness (Cohn & Leake, 2012). Additionally, environmental characteristics of non-urban areas, like proximity to nature, protect against distress (Beute & Kort, 2014). However, few studies explore resilience in minoritized people especially in rural areas and scholars have called for more work in this area (e.g., Matsuno & Israel, 2018).

Difficulties Measuring the Global Impact of Geographic Location

Marginalization and location are major factors in global mental health research but isolating their impact in multinational samples is difficult (see Mountrakis et al., 2005). Researchers of non-urban health tend to focus on single minoritized populations, use qualitative methods, and/or recruit from a single country (e.g., Jokela et al., 2015). Usually, calculating the psychological impact of non-urbanity involves an imprecise process of clustering participants into regions that are assigned psychological characteristics (Götz et al., 2018). Attempts to calculate non-urbanity generally include some degree of imprecision because they are based on somewhat arbitrary and/or broad spatial demarcations (see Mountrakis et al., 2005).

In most current research, investigators collect categorical information about a participant's general location (e.g., their city, county, or zip code) and they use that information to estimate the characteristics of the space surrounding the participant (Waldorf & Kim, 2015). For example, some researchers collect participant postal codes and use census-based, or government endorsed population data to determine whether the population size of that area qualifies as non-urban (Rosenkrantz et al., 2017). That process is complicated by the fact that different countries, agencies, researchers, and organizations use different population figures to determine non-urbanity (Mountrakis et al., 2005; Waldorf & Kim, 2015). Other researchers use more complex calculations of relative rurality (or deviation from urbanity) to compare the characteristics of one postal area to other areas in the same region, province, or state (Waldorf & Kim, 2015).

Purpose of the Present Study

The present study was designed to test explicit associations between distance and minoritized experience as they relate to global mental health. To facilitate precision, the researchers obtained geospatial coordinates that allowed them to determine each participant's proximity to the heart of their

region's legislative center and largest city. Qualitative data were also collected to further aid interpretation and application of the quantitative findings. Using those qualitative data, thematic analyses were conducted to provide rich, descriptive data related to geographic location.

Hypothesis one was that participants who identified with marginalized identities would report higher distress and fewer psychosocial resources than participants who did not. Given its association with most of the primary variables in the study, age was included in all regression models as a control variable. Additionally, psychosocial variables were included in distress models and vice versa to further specify those models and control for the curative/deleterious impact of those variables, given the focus on mental health. Hypothesis two was that greater distance from legislative/urban centers would predict increases in distress after controlling for age, minoritized identities/experiences and resilience variables. Hypothesis three was that greater distance from legislative/urban centers would predict reductions in psychosocial resources after controlling for age, minoritized identities/experiences and distress variables. Thematic analyses were guided by the question, "What are common themes in responses offered by minoritized people about their experiences in their locale?"

Method

This cross-sectional, survey-based study of health and location includes an analysis of an international sample collected by scholars at universities in (masked for review). Sampling took place from September 2019 to June 2020. The study was preregistered (masked OSF link) and the authors adhered to the preregistration as closely as possible. The study was approved by the Institutional Review Board at each university, followed all relevant ethical guidelines, and adhered to all legal requirements of the countries in which data were collected.

Sample

The convenience sample included 1733 participants, 18 years old or older ($M = 23.72$, $SD = 8.59$). Participants identified places of primary residence that fell within 45 different countries that included Nigeria, Greece, Germany, United Arab Emirates, Japan, and Poland. A comprehensive list is available on OSF. Given the focus of the present study on the experiences of minoritized individuals, the sample was split into two groups: a reference group ($N = 286$) of people who denied and/or did not endorse any minority identities and a focal group ($N = 1,447$) of people who endorsed one or more ($Median = 2$; $Range = 1-10$) minoritized identities/experiences (e.g., LGBTQ+ identity, physical disability,

Table 1 Demographics

	<i>Reference Group</i>		<i>Focal Group</i>	
	<i>(N = 286)</i>		<i>(N = 1,447)</i>	
	<i>N</i>	<i>%</i>	<i>N</i>	<i>%</i>
Gender identity				
Cisgender woman	196	68.5	397	27.4
Cisgender man	87	30.4	814	56.3
Transgender woman			19	1.3
Transgender man			72	5.0
Nonbinary			94	6.5
Genderqueer			24	1.7
Gender diverse			5	0.3
Agender			5	0.3
Blank/no response	3	1.0	17	1.2
Sexual orientation				
Heterosexual/Straight	284	99.3	840	58.1
Bisexual			226	15.6
Lesbian			55	3.8
Gay			105	7.3
Pansexual/romantic			80	5.5
Queer			68	4.7
Asexual			51	3.5
Diverse orientation			9	0.6
Blank/no response	2	0.7	13	0.9
Race				
White, European	185	64.7	668	46.2
Latino/a/x/e			201	13.9
Multiracial			169	11.7
Asian			162	11.2
Black/African American			106	7.3
Deutsch/German	84	29.4	81	5.6
Middle Eastern			32	2.2
African	5	1.7	8	0.6
Native/Indigenous			7	0.5
Blank	12	4.2	13	0.9
Exposure to minority stress*				
Unemployment			221	15.3
Larger body			179	12.4
Mental illness			112	7.7
Socioeconomics			82	5.7
Cross-cultural			65	4.5
Disability			50	3.5
Belief/faith			35	2.4
Physical illness			6	0.4
Body dissatisfaction			3	0.2
Social Isolation			3	0.2
other			2	0.1
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Minority ID	–	–	2.44	1.52
Age	24.40	9.95	23.59	8.29
Legislative distance**	204,226.79	214,923.82	284,378.40	327,047.72
Urban distance**	211,256.13	240,476.36	287,358.27	334,070.06

Exposure to Minority Stress = sum of minoritized identities/experiences. *Participants could select more than one option and values do not sum to 100%. **Distance is in meters

living in poverty). See Table 1 for a summary of the identities and experiences reported by participants.

The reference group was composed of people who were an average age of 24.40 ($SD=9.95$) who identified as heterosexual, cisgender, White and/or European (or Black in Nigeria), and denied or declined to endorse any minority identities. Participants in the focal group were 23.59 years old on average ($SD=8.29$). Focal group participants identified with minoritized identities such as bisexual ($N=226$, 15.6%) and Latino/a/x ($N=201$, 13.9%) and with minoritized experiences that included unemployment ($N=221$, 15.3%) and being larger bodied ($N=179$, 12.4%). Additional demographic information is provided in Table 1.

Consistent with preregistration documentation, the researchers recruited a robust international sample. Based on the Khamis and Kepler (2010) recommendation for sample size estimation in multiple regression ($n \geq 20 + 5m$, where m is the number of predictors) endorsed by Tabachnick and Fidell (2019), each of our regression equations required a minimum of between 50 and 55 participants to achieve adequate power. Given that we ran eight multiple regressions, our sample of 1733 participants was much larger than the estimated minimum of 440 participants needed to fully power the primary analyses.

Procedure

Participants were recruited from local university populations using university subject pools (e.g., SONA) and/or from the general public through gift card drawings. Data were collected using Qualtrics online survey software. Participants were presented with a consent form, followed by a geographic locator, a demographic form, and measures of anxiety, depression, satisfaction with life, social support, resilience, outness, and a free-response question. All measures of primary variables were presented in randomized order to reduce response-order bias. After completing the survey, participants were presented with a debriefing form and were redirected to their university's subject pool and/or to an incentive registration page, both of which were disconnected from the main survey to protect anonymity. The outness measure was a poor fit with the study sample and it was excluded from all analyses.

Instruments

Instruments used for this study were a mix of published and unpublished scales. The Outness Inventory (Mohr & Fassinger, 2000) was used to collect information about identity disclosure, but it performed poorly in the sample as evidenced by non-normal distributions, erratic response patterns, and wide standard deviations in the reference and focal samples (19.60 and 17.48). It is likely that, because the

measure was designed to detect disclosure of sexual orientation, the modified outness scale did not yield an accurate of general identity disclosure. Therefore, outness data were not included in the study analyses, but use of the scale is reported here to ensure that all measures used for this study are openly disclosed.

Surveys were presented in English to all participants except those in Germany who completed the survey in German. With the exception of the German site, the other universities at which the study was distributed used English as their default language. The lead investigator in Germany translated all demographic, free response, and debriefing items into German. Unless otherwise noted, all measures had been normed in both English and German. The anxiety and depression measures were translated into German by the Patient-Reported Outcomes Measurement Information Systems (PROMIS) Health Organization and were licensed for this study.

Geographic Locator

For this study, participant locations were recorded using a Google Maps interface embedded in the Qualtrics survey. Participants were asked to voluntarily indicate the approximate location of their home by dropping a pin or marker on a Google Map. They were asked not to provide a specific address and they were informed that they could pick a business, landmark, or neighborhood near their home to appropriately obscure their exact place of residence. The latitude and longitude of the marker were recorded by Qualtrics.

The approach to measuring non-urbanity in this study is different from other published approaches.

Demographics

Participants were asked to respond to basic demographic questions. Likelihood of exposure to minority stress was calculated by summing the number of minority identities and/or experiences reported by each participant (see Table 1). Some minority identities were contingent on the country from which the data were collected. For example, a person who identified as Black in the United States was considered to hold a minoritized identity, but people who identified as Black and were from the partner university in Nigeria were not.

Anxiety Symptoms

Anxiety symptoms were measured using the PROMIS Anxiety 8a (Health Measures, 2019a), an eight-item, self-report measure. Responses are scored on a five-point Likert-type scale that ranges from *Never* (1) to *Always* (5). Sample items include, "My worries overwhelmed me," and "I felt

anxious.” Items are summed ($Range = 8–40$) and converted to t -scores, consistent with the measure scoring manual. Higher t -scores indicate higher levels of anxiety. The scale demonstrated good internal consistency in the present study ($\alpha = 0.95$).

Depression Symptoms

Depression symptoms were measured using the PROMIS Depression 8b (Health Measures, 2019b), an eight-item, self-report measure. Responses are scored on a five-point Likert-type scale that ranges from *Never* (1) to *Always* (5). Sample items include, “I felt like a failure,” and “I felt worthless.” Items are summed ($Range = 8–40$) and converted to t -scores. Higher t -scores indicate higher levels of depression. The scale demonstrated good internal consistency in the present study ($\alpha = 0.94$).

Life Satisfaction

Life satisfaction was measured using the Satisfaction with Life Scale (SWLS; Diener et al., 1985; German translation by Glaesmer et al., 2011). The SWLS is a five-item, self-report measure. Responses are scored on a seven-point Likert-type scale that ranges from *Strongly disagree* (1) to *Strongly agree* (7). Sample items include, “In most ways, my life is close to ideal,” and “I am satisfied with my life.” Items are summed ($Range = 5–35$) and higher summary scores indicate greater life satisfaction. The scale demonstrated good reliability in the present study ($\alpha = 0.89$).

Social Support

Social support was measured using the Enhancing Recovery in Coronary Heart Disease (ENRICH) Social Support Inventory (Mitchell et al., 2003). The measure is a seven-item self-report scale that measures general social support in daily life. Responses are scored on a five-point Likert-type scale that ranges from *None of the time* (1) to *All of the time* (5). The final question asks whether the participant is married or living with a partner, with *yes* (4) and *no* (2) options. Higher scores indicate higher levels of social support ($Range = 7–35$). A sample item is, “Can you count on anyone to provide you with emotional support (talking over problems or helping you make a difficult decision)?” Cordes et al. (2009) translated the scale into German but omitted the last two items. The primary investigator in Germany translated the last two items, matching the form and content of the five published, translated items. The ENRICH has been used as a more general social support measure outside of coronary heart disease research, especially when a social support measure is required in a language other than English (e.g., Khin et al., 2021). The scale demonstrated good

reliability in the overall study ($\alpha = 0.89$) as well as in the German sample ($\alpha = 0.85$).

Resilience

Resilience was measured using the Connor-Davidson Resilience Scales 10 (CD-RISC-10; Campbell-Sills & Stein, 2007). The CD-RISC is a 10-item self-report scale. Responses are scored on a five-point Likert-type scale that ranges from *Not at all true* (0) to *True nearly all of the time* (4). A sample item is, “I am not easily discouraged by failure.” A summary score is generated by summing responses. Higher scores indicate higher levels of resilience ($Range = 0–40$). The scale and its translations are under copyright and must be licensed for distribution. The CD-RISC-10 demonstrated good reliability in the present study ($\alpha = 0.88$).

Free Response Item

At the end of the survey, but prior to being presented with the debriefing form, participants were provided with a free response box beneath the statement, “Please write any reflections or thoughts about your geographic location and/or identities below. For example, how does your location impact you (your safety, health, relationships, etc.)?” Most participants responded to the prompt and the resulting content appeared to further clarify study findings. Free response data were analyzed using qualitative methods outlined in the analysis plan.

Analysis Plan

A total of 2116 participants accessed the survey and progressed past the informed consent form. Cases were removed based on the following criteria: the participant did not provide latitude and longitude for their home location ($N = 118$), the participant did not finish at least 50% of one or more of the primary measures ($N = 143$), the participant did not pass the attention check question ($N = 109$), or the participant responded to three or more of the measures by endorsing only the extreme upper or lower items ($N = 13$). Scholars suggest that there is no established guide for determining what proportion of missing data in a data set is acceptable, but some scholars question the validity of data sets within which more than 10% of data are missing (Dong & Peng, 2013). Despite the fact that our decision to remove participants with more than 50% of data missing for one or more primary measure was liberal by most standards, it still resulted in a dataset with only three missing data points. This indicates that participant response sets either lacked a very large amount of data or almost none at all. The resulting sample contained 1733 complete cases. Consistent with simultaneous mixed-method approaches, quantitative and

qualitative data were analyzed separately and then were compared to further aid in analysis and interpretation. Pre-registration documentation was posted on the Open Science Framework (OSF; link masked) prior to data collection. Data, study materials, and analysis code are also available on OSF at the link provided.

Quantitative Analyses

Only three data points were missing at random in the full data set and they were addressed using multiple imputation by chained equations (*mice*) in R. ArcGIS was used to determine the country within which each participant fell. For each country that contained at least one participant, state/region/province level divisions were identified using The Database of Global Administrative Areas ([GDAM], 2020). Then, the largest city and the legislative center for each region were identified using online resources such as official government pages, Wikipedia, and Google Search widgets. Coordinates for each location were then obtained using *tidyverse* and *ggmap* packages in R (R Core Team, 2013) to pull Google Map API data. Euclidean distance values (for distance from legislative and urban centers) were generated in ArcGIS by locking participants to their legislative regions using GDAM (2020) maps.

Assumptions underlying multiple linear regression were checked for the focal group using diagnostic plots in R. Both criterion (distance) variables were trimodal and platykurtic. Small samples of skewed data are not appropriate for linear analyses, but the Central Limit Theorem indicates that large samples produce a normal distribution of means regardless of the individual variable distributions (Tabachnick & Fidell, 2019). Given that the sample was large and that all regression models included 1439 or greater degrees of freedom, the use of linear regression analyses were appropriate for the present study.

Demographic frequencies (Table 1) and descriptive statistics for the published scales were computed, including *t*-tests for between group differences (Table 2). Kendall’s Rank Order Correlation coefficients were calculated for primary variables (Table 3), as a nonlinear alternative to Pearson’s *r*, given the platykurtic distribution of the predictor variables. Raw scores were converted to standardized *z*-scores prior to including them in the regression model. Analyses were conducted with linear model (*lm*) and associated functions in R 4.0.2 (R Core Team, 2013) to test the hypotheses.

Table 2 Descriptive statistics for primary variables and comparisons between groups

	Reference Group (N=286)		Focal Group (N=1,447)		α	<i>t</i>	95% CI
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>			
Anxiety	54.13	8.02	60.60	9.15	0.94	-12.16***	[-7.523, -5.430]
Depression	52.48	8.75	59.03	10.99	0.95	-11.04***	[-7.717, -5.385]
Satisfaction	26.19	5.54	20.78	6.79	0.89	14.50***	[4.682, 6.149]
Support	28.04	4.40	25.12	5.75	0.89	9.67***	[2.324, 3.508]
Resilience	39.37	5.46	35.29	6.79	0.88	11.07***	[3.360, 4.811]

CI=confidence interval. * *p* < .05. ** *p* < .01. ****p* < .001

Table 3 Correlations for primary variables among minority identified participants

Variable	1	2	3	4	5	6	7	8	9
1. Anxiety	–								
2. Depression	0.61***	–							
3. Satisfaction	-0.30***	-0.42***	–						
4. Support	-0.20***	-0.30***	0.38***	–					
5. Resilience	-0.32***	-0.35***	0.36***	0.24***	–				
6. Exposure	0.30***	0.30***	-0.28***	-0.20***	-0.19***	–			
7. Age	0.04*	0.06**	-0.04*	0.004	-0.01	0.13***	–		
8. Legislative	0.04*	0.01	0.02	-0.003	0.03	0.0004	-0.07***	–	
9. Urban	0.01	0.004	0.01	-0.01	0.03	0.01	-0.05**	0.52***	–

N=1,447. Exposure=exposure to minority stress or sum of minoritized identities/experiences. **p* < .05. ***p* < .01. ****p* < .001

Qualitative Analyses

First, given that some responses were in German, a R script was written to translate all German responses to English using the Google Cloud Translation API (see open science framework). Of the 1733 participants, 1272 answered the free response question. Open-ended responses contained an average of 45.2 words ($SD = 42.8$). Given the response length, the researchers used conventional content analysis (Hsieh & Shannon, 2005) to describe how participants thought about identity, healthcare, and well-being contextualized by location.

A team of four researchers met to code the qualitative data using NVivo 12. Nvivo 12 is a software used to aid in the organization, visualization, and analysis of qualitative data. The team coded the same 10 responses and met to discuss disagreements and similarities. After achieving consensus, they independently coded 50 more responses and met to discuss trends in the data. From then on, the team independently coded, on average, 315 responses each, meeting approximately every other week to discuss trends in their unique coding schemes (Patton, 2015). After all of the data had been coded, the team merged their coding schemes and data sets together into a composite code list of about 60 codes. The team then discussed how to link the codes into meaningful clusters (Hsieh & Shannon, 2005). Team members agreed on cluster names (i.e., themes and sub-themes) and selected illustrative excerpts (Table 5).

Results

Hypothesis One

In support of hypothesis one, mean levels of all measured variables differed significantly ($p < 0.001$) between the reference and focal groups. Focal group participants reported significantly higher levels of distress (anxiety and depression) and significantly lower levels of psychosocial resources (satisfaction, support, and resilience) than reference group participants (Table 2). Most primary variables correlated as expected, such that as distress variables increased, psychosocial resources decreased (Table 3). Age was correlated with both location variables such that, as age increased, distance from legislative and urban centers decreased. Full regression results for the equations in which both predictor variables were significant are provided in Table 4.

Hypothesis Two

To test the legislative component of hypothesis two, the researchers ran four multiple regressions, two with anxiety and the other two with depression as outcome variables. In all models, age, exposure to minority stress, life satisfaction, and psychosocial resources were entered as control variables. The predictive significance of legislative and urban distance were tested in separate anxiety and depression models.

Table 4 Regression results for hypothesis tests with two significant predictors

Variable	<i>B</i>	<i>SE B</i>	<i>t</i>	<i>p</i>	95% CI
Anxiety					
Age	− 0.037	0.022	− 1.659	.099	[− 0.080, 0.007]
Exposure to Minority Stress	0.246	0.024	10.263	< .001	[0.199, 0.293]
Satisfaction	− 0.185	0.029	− 6.390	< .001	[− 0.242, − 0.128]
Resilience	− 0.292	0.026	− 11.427	< .001	[− 0.342, − 0.242]
Support	− 0.002	0.026	0.068	.946	[− 0.049, 0.053]
Legislative Distance	0.078	0.022	3.530	< .001	[0.034, 0.120]
Resilience					
Age	0.053	0.023	2.320	.021	[0.008, 0.098]
Exposure to Minority Stress	− 0.075	0.025	− 3.005	.003	[− 0.124, − 0.026]
Anxiety	− 0.145	0.037	− 3.935	< .001	[− 0.217, − 0.072]
Depression	− 0.356	0.037	− 9.702	< .001	[− 0.427, − 0.284]
Legislative Distance	0.051	0.023	2.233	.026	[0.006, 0.095]
Resilience					
Age	0.054	0.023	2.360	.019	[0.009, 0.099]
Exposure to Minority Stress	− 0.076	0.025	− 3.053	.002	[− 0.125, − 0.027]
Anxiety	− 0.138	0.037	− 3.762	< .001	[− 0.210, − 0.066]
Depression	− 0.358	0.037	− 9.781	< .001	[− 0.430, − 0.286]
Urban Distance	0.048	0.023	2.096	.036	[0.003, 0.092]

CI confidence interval; *b* standardized beta, *SE B* standard error for standardized beta. Exposure to minority stress sum of minoritized identities/experiences. *p* values in bold are significant

Table 5 Qualitative themes, sub-themes, and representative quotes

Theme	Subthemes	Quote
Safety	<i>feeling safe, location is safe in rate of crime, security, OR crime, dangerous, not safe as: female, sexual minority, and/or in a work environment</i>	“The location I live in is very open and is very safe. It has friendly neighbors and is also a diverse neighborhood. I do find it easy to go for walks and hang out with some of my neighbors constantly, which helps with my mental health and helps me develop more relationships” “Living in the middle of nowhere is weird, even though it's a college town. All of my friends are queer, but none of us are from here, and people that are from here look down on us a lot. I do not feel safe or welcome in my community.”
Connection	<i>having friends, family, long-term relationships, close relationships, social support</i>	“I personally feel as though my perception of my geographic location is based entirely on my current interpersonal relationships. Because I have such a wonderful relationship with my family, a strong connection with my friends, a great support group, and am neighbors to friends I grew up with together, the fact that we live in a neighborhood that isn't necessarily the safest and far from financially sound, doesn't faze me. In fact, it provides me with more hope.”
Disconnection	<i>concerns of distance between family, friends, partner, school issues with sociality, moving</i>	I am physically isolated from my peer groups [...] The trans support group I participate in is a 45-min drive from my house, and I haven't belonged to a Jewish congregation since our family synagogue dissolved ten years ago [...] Most of my friends live at least 20 min away; my romantic partner lives an hour away and that makes it difficult to see them outside of planned dates/outings
Environmental Privilege	<i>access to health care and support in finding healthcare OR lack of access to healthcare</i>	As a student, I have my own beautiful apartment in my [town name]. Most of the time, however, I like to spend my time with my partner who runs a farm. I cling with heart and soul to this place—a small farm in the middle of a growing village that has everything you need: doctors, banks, shops. My own apartment in [town name] is very comfortable and centrally located Job security is pretty minimal here which terrifies me. [...] Disability access is so-so which is discouraging because there are a lot of places I can't go if I need my chair that day. Transportation is miserable. [...] Suburbia here is really isolating. I don't have local friends because I'm unable to go places to meet people or hang out with anyone I do meet. My mental health has gotten way worse, and there are very few resources I am able to utilize either due to transportation or cost
Discrimination and Identity	<i>stigma, bullying, identity concealment, -isms</i>	I'm an FTM transgender who live in the less open-minded side of [Country]. I rarely go out of home [...] My health is bad because I have mental issues and born physical issues [...] whenever I end up in ER, <i>sometimes</i> doctors refuse to take me in because of my transgenderism [...] I used to work in sales and was assaulted [...] Since then, I'm kind of really scared of people [...] no one hires me [...]

Legislative Distance and Distress

The legislative anxiety model was significant, $F(6,1440) = 109.4$, $p < 0.001$, accounted for 31.03% of the variance. Consistent with hypotheses, distance, $B = 0.077$,

$p < 0.001$ was a significant predictor of anxiety such that, as distance increased, so did anxiety (Table 4). Likewise, the legislative depression model also was significant, $F(6,1440) = 182.1$, $p < 0.001$, accounted for 42.90% of the

variance. However, legislative distance was not a significant predictor of depression.

Urban Distance and Distress

The urban anxiety model was significant, $F(6,1440)=106.40$, $p<0.001$, accounted for 30.44% of the variance in anxiety. The urban depression model was also significant, $F(7,1440)=181.40$, $p<0.001$, accounted for 42.81% of the variance. Urban distance was not a significant predictor of anxiety or depression.

Hypothesis Three

To test the legislative component of hypothesis three, the researchers ran four multiple regressions, two with resilience and the other two with social support as outcome variables. In both models, age, exposure to minority stress, and distress were entered as control variables. The predictive significance of legislative and urban distance were tested in separate anxiety and depression models.

Legislative Distance and Psychosocial Resources

The legislative resilience model was significant, $F(5,1441)=104.10$, $p<0.001$, accounted for 26.28% of the variance. Contrary to hypothesis 3, as legislative distance increased, so did resilience, $B=0.051$, $p<0.05$ (Table 4). Additionally, the legislative social support model was significant, $F(5,1441)=75.56$, $p<0.001$, accounted for 20.50% of the variance. However, legislative distance was not a significant predictor of social support.

Urban Distance and Psychosocial Resources

The urban resilience model was significant, $F(5,1441)=103.90$, $p<0.001$, accounted for 26.25% of the variance. Contrary to hypothesis 3, urban distance shared a significant positive association with resilience, $B=0.048$, $p<0.05$, such that, as urban distance increased, so did resilience (Table 4). Likewise, the urban social support model was significant, $F(5,1441)=75.66$, $p<0.001$, accounted for 20.52% of the variance. However, urban distance was not a significant predictor of social support.

Qualitative Exploratory Analyses

All participant responses to the free response question in the study survey were pooled and analyzed together. The resulting themes and descriptive data were used to further explain and contextualize the quantitative results. Five primary themes emerged from the data: safety, connection, environmental privilege, discrimination and identity, and

disconnection. Themes, subthemes, and exemplar responses are noted in Table 5. Although additional sub-themes surfaced, the primary themes are presented here because they occurred most frequently across participants and they offer a more robust picture of participant experiences related to identities and location.

Safety

Participants ($n=393$, 30.89%) discussed experiences of safety. They reported feeling safe in their locations due to a sense of security, low crime, and familiarity with neighbors. However, among the participants endorsing this theme, 76 (19.33%) reported feeling unsafe where they lived due to their identity, high crime, or a dangerous neighborhood.

Connection

Participants ($n=220$, 17.30%) noted the importance of social connection. Physical proximity to social support mattered most to participants. Connection to supportive peers, the acceptance of family members, and neighborhood involvement compensated for the lack of safety for some participants.

Disconnection

Participants ($n=93$, 7.31%) described disconnection from social support, such as isolation within their communities, unfriendly neighbors, or judgmental families. Most participants within this theme described physical distance as a barrier to health and well-being. Living far from family, friends, or partners was challenging.

Environmental Privilege

Participants ($n=160$, 12.58%) described their environmental privilege. Responses primarily focused on access to healthcare, general wealth, opportunities for recreation (e.g., proximity to shopping, gyms, etc.), and the presence of beautiful outdoor spaces. However, just over a quarter ($n=46$; 28.75%) of participants who endorsed this theme reported living in underserved areas with limited medical providers and few structural supports.

Discrimination and Identity

Participants ($n=120$, 9.43%) discussed experiences of discrimination and the influence of their environments on identity. In terms of discrimination, participants reported experiences of microaggressions, threats, and bullying. They also talked about identity concealment and possible stigmatization due to their difference from the local majority.

Discussion

In this study, the authors explored associations between distance from urban/legislative centers and mental health in marginalized populations using coordinate-based geographic location data. They collected a relatively large, diverse sample of data that allowed for the investigation of geography-based (urban/rural) mental health dynamics in a sub-sample of people with multiple marginalized identities. Increased distance from legislative centers predicted increases in anxiety and resilience reported by participants with marginalized identities. Increased distance from urban centers also predicted increases in resilience among marginalized participants. Qualitative data supported a mixed view of non-urbanity as both distressing and psychosocially supportive for the full sample of participants as evidenced by the production of five primary themes (safety, connection, disconnection, environmental privilege, and discrimination and identity).

Minoritized Experience and Mental Health

Detected associations between minoritized experience and anxiety, depression, and social support were consistent with current theory regarding multiple minority status (Swann et al., 2020). Results suggest that people with more marginalized experiences are faced with higher levels of distress and lower levels of support, regardless of where they live. Qualitative data further emphasized participant's perceptions that their environment played a vital role in their health.

Results also indicated that holding higher numbers of marginalized identities predicts lower levels of resilience. Those findings seem to contradict research suggesting that some people with multiple marginalized identities enjoy greater resilience (Currin et al., 2021). It is possible that, when considering only aggregate identity in a global sample, individual differences and strategies are obscured. For example, many participants reported discrimination, but it was clear that experiences of bullying looked different for different participants. Thus, despite the limitations of small samples, limited studies may more effectively identify community-specific strategies and dynamics that are obscured in larger groups of minoritized people.

Distance and Distress

The present study is the first that the authors know of to collect home coordinates from minoritized participants that allowed for the precise calculation (within a few

meters) of distance from city centers, rather than grouping participants into aggregated clusters or regions. In some sense, calculating remoteness as raw distance from largest urban/legislative center in a given region relies on a literal and narrow interpretation of non-urbanity (Mountrakis et al., 2005). However, it allowed the researchers to test, with precision, an underlying assumption of non-urban research, that distance itself plays a role in distress and resilience in marginalized populations.

Of course, analyses that overlook resource distribution, policy, health care availability, and so on, fall short of answering broader questions about the unique spatial characteristics of individual countries and specific cities (Waldorf & Kim, 2015). That nuance and variation is reflected in the qualitative results that capture competing experiences such as connection and disconnection. Still, our findings lay the foundation for future, more nuanced studies by identifying global trends and by establishing anxiety and resilience as important focal variables in both general research and studies focused on marginalized populations.

Legislation and Anxiety

One key finding in the present study was that distance from regional legislative center predicted anxiety among minoritized participants. The inclusion of distance from legislative centers in the present study marked a shift from focusing purely on non-urbanity to a consideration of government dynamics as well. Researchers have not yet established a clear understanding of all of the ways that legislative threats may impact minoritized people, but there is evidence that even the threat of discriminatory laws increase distress (Flaskerud & Lesser, 2018). When it comes to worry, stress, and anxiety in particular, distance from legislative center may have a stronger impact on mental health than urbanity does. It is likely that both marginalized and privileged people experience this impact, but as new, restrictive (e.g., anti-abortion, anti-trans) laws are introduced in some states and countries, the impact on marginalized people in rural areas may be greater.

Findings indicate that legislation may have a spatial component such that new and existing laws limiting or granting rights to marginalized people impact urban/rural and marginalized/privileged communities differently depending on a variety of factors. There is some evidence that discriminatory policies and legislative battles embolden people who hold prejudiced views (Flaskerud & Lesser, 2018). It is possible that biased lawmaking radiates outward from legislative centers and that the effects of political battles over civil rights disproportionately affect those who are more distant from the decisions that are being made.

Distance and Resilience

Urban distance only predicted resilience and not any of the other variables measured in this study. On the surface, that finding seem completely contrary to prevailing theory, that large seats of power and population density are unique in their ability to provide support, access, and community for minoritized people. Findings may indicate that non-urban areas are not given due credit for their palliative and resilience-building aspects such as their proximity to nature and daylight (Beute & Kort, 2014). Psychologists and others are increasingly turning to nature as sources of therapeutic intervention (e.g., Richardson & McEwan, 2018). More research is needed to identify the resilience fostering aspects of non-urban residence for minoritized people.

The benefits and drawbacks of proximity to urban centers is not simple or straightforward. Great nuance of experience showed up in the qualitative data when individuals, for example, spoke about clinging rural locations. Even when a person's given location is not optimal, they are still likely to have resources at their disposal that can be used to offset or even defend against discriminatory restrictions and experiences. Urban and rural environments likely benefit both marginalized and privileged people alike, but those benefits may be very different and identity affirming resources that specifically benefit marginalized people may be more available in urban areas.

Implications for Community Mental Health

The present findings may help community mental health workers and governments around the globe to more effectively allocate and target interventions and services within their region. For example, treatment and prevention efforts in rural areas could include specific interventions for anxiety and may capitalize on existing resilience skills. As teletherapy and other remote services continue to proliferate across the globe, health service providers will benefit from spatial information about mental health phenomena across their respective regions. Such knowledge will enable them to spend advertising dollars wisely and will prepare them for the varieties of psychological distress they may encounter when providing services to patients in a given geographic area. It may also be important to consider other key variables such as age when designing or deploying interventions, given that age was correlated with most of the primary variables in this study.

Strengths, Limitations, and Future Research

The present study was the first, large sample, global investigation of mental health and coordinate-based geographic location. Novel elements included the use of coordinates to

gauge participant location relative to legislative/urban centers and the inclusion of multiple marginalized identities in data collection and analysis. However, the study was subject to the limitations of cross-sectional, correlational research and it included a number of other limitations. Despite the fact that this study pulled together data from a global sample of 47 countries, some countries and regions were not represented. Participants were recruited through partnerships with universities and participant mean age was low. Furthermore, qualitative analyses did not take into account rurality or marginalized identities of individual respondents. Therefore, the qualitative results should be interpreted with caution and only in the context of the present study. Future studies may benefit from the use of more fine-tuned qualitative methods.

During data collection, the world entered a global pandemic. Replication studies are needed to confirm the present findings in a more globally representative sample collected outside of a global pandemic. The outness scale (Mohr & Fassinger, 2000) was omitted from analyses. The scale was a poor fit with the sample as demonstrated by the wide standard deviation (19.60 and 17.48) in both sub-samples and by the fact that outness levels did not significantly differ between the comparison and focal groups. The scale was initially developed to measure sexual orientation outness and the items did not generalize well to other identities. Use of better measures of minority identity disclosure may strengthen future studies.

Conclusion

The present study built on past research by broadening the scope of non-urban research to include global minoritized people and more precise location data. Results indicate that legislative centers may play a stronger role in mental health for marginalized people than has been previously identified. Researchers may benefit from further investigating resilience in global marginalized populations and developing global indices of rurality.

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Data Availability This study was formally preregistered on the Open Science Framework (OSF). De-identified data, a code-book, and data analysis scripts are archived on OSF at <https://osf.io/ewhqk/> and are available to qualified researchers upon formal request. The materials used in this study are widely available, though some instruments may require author permission and payment of a fee prior to use.

Declarations

Conflict of interest On behalf of all authors, the corresponding author states that there are no conflicts of interest to report.

Ethical Approval All participants in the study indicated informed consent through a process approved by Institutional Review Boards at each university at which the survey was conducted. The authors followed the American Psychological Association ethics code and other relevant ethical guidelines.

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