

Demographic, Psychosocial, and Perceived Environmental Factors Associated with Depression Severity in a Midwest Micropolitan Community

Jason D. Daniel-Ulloa, PhD, MPH*

Barbara I. Baquero, PhD, MPH

Christine M. Kava, PhD

Mayra L. Smith-Coronado, MPH

Nicole L. Novak, PhD

Daniel K. Sewell, PhD

Adriana Maldonado, MA

Heidi L. Haines, MS

Claudia Gates

Edith A. Parker, Dr.PH

Abstract

The purpose of this study was to inform a community-engaged partnership concerned with mental health in their community by exploring factors associated with depression among a sample of residents in a micropolitan city in a rural state. Social and contextual factors are important influences on depression risk, but most research in this area has focused on urban settings. Micropolitan areas (midsize rural communities centered around a population core of 10,000-50,000 people) are home to the majority of rural residents and this specific social and economic context may have unique influences on depression risk. Using a random-digit-dial sampling method, adult residents completed a phone interview that assessed a range of health behaviors and measures of quality of life, social support, neighborhood context, and discrimination ($n = 1101$). Results indicated that being male, having a partner, and being a high school graduate protected against moderate to severe depression, whereas inadequate social support, perceived unfair treatment, and lower neighborhood cohesion were associated with moderate to severe depression. Increases in poverty were significantly associated with greater odds of reporting moderate to severe depression. This study demonstrated that factors associated

with depression are similar factors in rural and urban areas, however, the prevalence of these factors may differ along the rural-urban continuum, and should be considered when developing and implementing mental health prevention and control interventions.

*Corresponding author can be reached at:
jdaul@uw.edu

Introduction

Depression is the leading cause of disability, impacting over 300 million people worldwide (World Health Organization, 2018). The 2015 National Survey on Drug Use and Health estimated that 6.7% of adults (ages 18 or older) in the United States (U.S.) had at least one major depressive episode in the past year (Center for Behavioral Health Statistics and Quality, 2016). Some research has documented a difference in depression rates between rural and urban settings. For example, Probst et al. (2006) found the prevalence rate for depression to be 6.1% among rural residents, which was significantly higher than the prevalence found for urban residents (5.2%). Socio-ecological factors and the impact of place, where an individual resides and interacts, are important factors to consider in order to better understand factors that contribute to depression risk as well as other disparities in

health outcomes (Diez Roux 2002; Institute of Medicine, 2002). However, less is known about depression risk in “micropolitan cities.”

Some research has found that residence in midsize rural, or “micropolitan,” communities is associated with a greater risk of depression. The National Survey of Drug Use and Health found that residents of micropolitan areas (i.e., nonmetro areas centered on a cluster of 10,000 to 50,000 people), had higher depression risk than smaller rural areas (< 10,000; Breslau et al., 2014). Micropolitan areas are an important subset of rural (nonmetropolitan) areas—the majority (59%) of all rural residents live in micropolitan areas, and micropolitan areas continue to grow even as the overall nonmetropolitan population declines (Ingram & Franco, 2014).

Economic and demographic shifts in rural America, especially since the Great Recession, have led to important shifts in social determinants of health in micropolitan areas. For example, micropolitan areas tended to have a slower post-recession recovery of poverty and unemployment levels than either urban or more rural counterparts (Bennett et al., 2018). Economic distress in micropolitan areas may have upstream influences on health and wellbeing, making it important to examine social and contextual influences on depression risk in micropolitan communities.

As there is a dearth of data related to depression in micropolitan areas, we must look to depression in rural and urban areas for factors that might be associated with risk in micropolitan cities. Research conducted in urban, and to a lesser extent rural areas, has identified a number of socioecological factors that are associated with depression risk, including neighborhood disadvantage (Silver et al., 2002), neighborhood social disorder (Cutrona et al., 2005), social support (Choenarom et al., 2005), and discrimination

and unfair treatment (Schulz et al., 2006). At the interpersonal level, social support and social networks have been proven to be important buffers between stress and depression (Ozbay et al., 2007; Raffaelli et al., 2013; Takizawa et al., 2006). A review of the literature pertaining to social support and mental health in rural areas found that having a social support system can positively affect mental health outcomes, including depression (Letvak, 2002). At the community level, neighborhood characteristics and neighborhood disadvantage have been found to be associated with depression risk in urban and rural areas. Studies of mostly urban residents have found that residents of neighborhoods with better physical and social environments and higher social cohesion had lower risk of depression and lower depressive symptoms than residents of other neighborhoods (Echeverría et al., 2008; Mair et al., 2009). Neighborhood disadvantage has been found to be associated with greater rates of depression among residents in both urban and rural areas (Cutrona et al., 2005; Silver et al., 2002). In rural areas specifically, neighborhood and community factors that have been shown to contribute to depression have included poverty, social disorder, access to mental health services, lack of health insurance, and fear of stigma (Brossart et al., 2013; Cutrona et al., 2005; Griffiths & Christensen, 2007). At the societal level, there is an abundance of literature regarding the physical, emotional, and mental health impacts of experiencing discrimination, racism, or perceived unfair treatment (Paradies et al., 2015; Williams & Mohammed, 2009).

While there is evidence associating various social and contextual factors to depression risk in urban and rural areas, there remain gaps in the literature with respect to micropolitan areas. Micropolitan areas represent unique and dynamic areas with their own socioecological context that should

be considered when exploring depression risk. This paper aims to begin to fill this gap by describing a study that was prompted by a community-engaged partnership based in a micropolitan community in a rural state. The partnership was specifically interested in examining factors that may be associated with depression severity among a sample of community residents in their community.

Methods

Community-Academic Partnership

The data for this study come from the University of Iowa Prevention Research Center (UIPRC) 2013 Ottumwa Community Health Survey, designed to identify health issues for interventions in the Ottumwa community. This survey was collaboratively designed by a community-academic partnership, Ottumwa Community Advisory Board (CAB). The CAB began in April of 2013 as a partnership between the Prevention Research Center at the University of Iowa College of Public Health and local organizations and residents of Ottumwa, Iowa. The CAB initially consisted of representatives from 12 local agencies, including the local health department, school system, a local bank, the YMCA, city parks department, and the Southeast Iowa Economic Development Agency.

Setting

The setting for this study was a micropolitan city in southeast Iowa with a population of 24,454 (U.S. Census Bureau, 2017b) and the county seat of Wapello County. The majority of county residents (70%) live in this micropolitan city. Similar to many other rural micropolitan cities around the Midwest, residents experience high unemployment rates (4.5%; U.S. Bureau of Labor Statistics, 2017) and high poverty

rates (20.5%; U.S. Census Bureau, 2017b) compared to the state of Iowa averages, 2.8% (U.S. Bureau of Labor Statistics, 2017) and 11.8% respectively (U.S. Census Bureau, 2017a).

As a new destination community this town has seen a relatively large influx of Latino residents. In 1990, the Latino population was approximately 200. By 2010, the population had grown to 11.3% of the total population. Latinos were drawn to the area by jobs in meatpacking, affordable housing, and safe neighborhoods (Jordan, 2012; Kim, 2013; Rural Migration News, 2013). Also, as in many towns that experience similar demographic shifts, Latinos moving into the area are younger than the overall population. The influx of working age adults contributes significantly to local economies. However, local health system providers and organizations become strained for resources as they are required to provide services for Spanish-speaking or Latino residents. This is particularly true for mental health services, as rural areas already experience significant disparities in mental health services overall (Rural Health Information Hub, 2017), and a change in demographics (e.g., age, ethnicity, and background) adds strain on the system.

Study Design

The survey used a random-digit-dial sampling method and was implemented by the University of Northern Iowa Research Center. The survey was reviewed by the CAB and consisted of 89 questions that assessed a range of health behaviors (e.g., heavy drinking, smoking, and diet) and measures of quality of life, social support, neighborhood context, and discrimination.

Participants were randomly selected from a dual sampling frame using land and cell phone numbers. Eligible participants were adult residents who had resided in Ottumwa for at least six months. Potential participants

were contacted on varying days and times. Once reached, the household member that was closest to their birthday was selected as household representative. Interviews were conducted in Spanish or English. Over-sampling was used to increase the number of Latino participants. A \$25 gift card was mailed to each person that completed the survey. Of the 4,000 numbers identified and contacted, approximately 25% responded ($n = 1,101$). Protocols and procedures were approved by the University of Iowa Institutional Review Board.

Measures

Demographics. Demographic survey items were drawn from national surveys (Behavioral Risk Factor Surveillance System [BRFSS], National Health and Nutrition Examination Survey [NHANES], and American Community Survey [ACS]) for compatibility. For this survey we used self-reported items to assess age, gender, relationship status (married/living with partner/steady partner vs. divorced/never married/not in a relationship), Latino (Latino vs. Non-Latino white or African American), living at or below 125% of the federal poverty guidelines, and education (completed at least one year of college vs. completed high school or less).

Neighborhood context. Neighborhood context was measured using a six-dimension scale that assessed social cohesion (four-items), aesthetics (six-items), safety (three-items), walkability (seven-items), food environment (three-items), and violence (five-items; Mujahid et al., 2007; Mujahid et al., 2008). The original scale included a subscale that measured activities with neighbors, which was excluded from the current analysis based on feedback from the CAB that it was not applicable. Items were scored on a scale of 1-5 (1 = strongly agree to 5 = strongly

disagree), except for violence and activities with neighbors, which were scored 1-4 (1 = often 2 = sometimes, 3 = rarely, and 4 = never). Each dimension was scored as a mean across items. As suggested by the CAB, one item was added to the violence sub-scale, "*Hard drug use in your neighborhood.*" For analysis, the scales were combined into three final constructs (Mujahid et al., 2008): (1) Social Neighborhood—the sum of aesthetics, safety, and violence; (2) Physical Neighborhood—the sum of walkability and food environment; and (3) Neighborhood Cohesion. Scales were standardized for analysis.

Social support. Social Support was measured using four items developed to measure instrumental and emotional support (Strogatz & James, 1986). The instrumental support item was coded and scored as described in Strogatz & James (1986); dichotomized as whether individuals expect support for house help, transport, or money or no support for any of the three. The emotional support item (one-item) was dichotomized by ability to confide in someone often or sometimes vs. rarely or never.

Everyday unfair treatment. Discrimination was measured using the Everyday Unfair Treatment Scale (Krieger et al., 2005; Schulz et al., 2006; Williams et al., 1997). In this analysis, we scored perceptions of unfair treatment in two ways. First, as an overall score calculated as a mean of all items dichotomized to any experience in the past 12 months vs. none. Second, we calculated perceived unfair treatment ascribed to race, which was also dichotomized as any vs. none. We conducted an item-by-item analysis on the Everyday Unfair Treatment Scale in order to further explore how unfair treatment is associated with depression.

Depression Severity. Depression severity was measured using the Patient Health Questionnaire 9 (PHQ-9; Kroenke & Spitzer, 2002). Scoring the PHQ-9 is a sum of the 9 items, each receiving a score from 0 (“not at all”) to 3 (“nearly every day”) for a possible range of 0 to 24. For this study we used the score cutoff of ≥ 10 for moderate to severe depression as discussed in Kroenke, Spitzer, and Williams (2001).

Data Analysis

Bivariate associations using chi-squared tests were used to assess simple relationships between demographics, neighborhood, social support, everyday unfair treatment, and depression in the total sample using the complete cases. Specifically, we created a dichotomous variable equal to one if a subject had moderate to severe depression, and zero if the subject had no or mild depression, and compared this binary variable to our other categorical variables via chi-squared tests of independence. We then used a generalized linear model based on the Bernoulli distribution using a logit link function (i.e., logistic regression) to investigate the relationship between depression severity and psychosocial and perceived environmental factors after adjusting for demographic variables. We used the dichotomized depression variable described above as our response variable, and used neighborhood, social support, and everyday unfair treatment as covariates; we additionally controlled for demographic variables (age, education, poverty, and gender) in our model. To address the missing data on variables of interest, we applied multiple imputation using the multivariate imputation by chained equations (MICE) procedure ($m = 100$; van Buuren, 2018) and combined these results according to Rubin’s rules (Rubin, 1987). Statistical analyses were conducted in R version 3.4.1 (R Core Team, 2017).

Results

Demographics

Of the 1101 people surveyed, 14% met the criteria for moderate to severe depression, 63% were women, 74% were 45 years old or older, 57% were in a committed relationship, and 93% were white. Just over 30% reported living in poverty and 89% had graduated high school (See Table 1 for details).

Social Support, Neighborhood Context, and Social Cohesion

Almost 65% reported adequate instrumental social support and over 90% reported adequate emotional support. The median score for the Social Neighborhood Scale was 12. The median score for Physical Neighborhood was 6.47. The median was used as the cutoff for dichotomizing the variables.

Perceived Unfair Treatment

The majority of respondents reported experiencing discrimination at least once (55%). Just over 2% reported discrimination due to race or ethnicity. A large proportion reported that at least once they were treated disrespectfully (40%), they received poor service (27%), they were treated like they were not smart (23%), that people were afraid of them (10%), or that they felt threatened or hassled (9%).

Bivariate Comparisons

Table 1 includes the chi-square analysis of covariates and depression severity. Based on the chi-square test of association and a significance level of $\alpha = 0.05$, demographic variables found to be associated with depression severity were being female ($p = 0.02$), of older age ($p = .007$), not in a

Table 1

Summary Statistics, and Chi-squared Tests of Independence between the Subject Characteristics and Moderate to Severe Depression

<i>Characteristic</i>	<i>Total Sample n(%)</i>	<i>PHQ-9 No Depression n(%)</i>	<i>PHQ-9 Moderate to Severe Depression n(%)</i>	<i>Chi- Square</i>
Gender				
Male	391 (37.5%)	351 (39%)	40 (28.4%)	5.39
Female	651 (62.5%)	550 (61%)	101 (71.6%)	(0.02)
Age				
18-24	71 (6.9%)	63 (7.1%)	8 (5.7%)	12.12
25-44	196 (19%)	166 (18.6%)	30 (21.3%)	(0.007)
45-64	402 (38.9%)	332 (37.2%)	70 (49.6%)	
65 and older	364 (35.2%)	331 (37.1%)	33 (23.4)	
Relationship Status				
Not Partnered	442 (42.6%)	363 (40.4%)	79 (56.8%)	12.67
Partnered	596 (57.4%)	536 (59.6%)	60 (43.2%)	(< 0.001)
Ethnicity				
Not Latino	965 (93%)	834 (93%)	131 (92.9%)	< 0.0001
Latino	73 (7%)	63 (7%)	10 (7.1%)	(1.00)
Education				
Did not graduate HS	117 (11.3%)	89 (9.9%)	28 (20.1%)	11.63
Graduated HS	921 (88.7%)	810 (90.1%)	111 (79.9%)	(< 0.001)
Poverty				
Not living in poverty	572 (69.8%)	524 (75.6%)	48 (38.1%)	69.48
Living in poverty	247 (30.2%)	169 (24.4%)	78(61.9%)	(< 0.001)
Emotional Social Support				
Inadequate	96 (9.2%)	57 (6.3%)	39 (27.9%)	64.44
Adequate	944 (90.8%)	843 (93.7%)	101 (72.1%)	(< 0.001)

Table 1 (cont.)

Summary Statistics, and Chi-squared Tests of Independence between the Subject Characteristics and Moderate to Severe Depression

<i>Characteristic</i>	<i>Total Sample n(%)</i>	<i>PHQ-9 No Depression n(%)</i>	<i>PHQ-9 Moderate to Severe Depression n(%)</i>	<i>Chi- Square</i>
NBHD Cohesion				
Neutral/Disagree	418 (44.6%)	342 (42.1%)	76 (60.8%)	14.55
Agree	519 (55.4%)	470 (57.9%)	49 (39.2%)	(< 0.001)
NBHD Social (higher better)				
Less than 12	355 (44.3%)	293 (42%)	62 (59.6%)	10.63
Greater than or equal to 12	446 (55.7%)	404 (58%)	42 (40.4%)	(0.001)
NBHD Physical (higher better)				
Less than or equal to 6.47(mdn)	469 (49.7%)	384 (47.2%)	85 (65.4%)	14.15
Greater than median	475 (50.3%)	430 (52.8%)	45 (34.6%)	(< 0.001)
Experienced Discrimination				
Did not because of race	968 (97.8%)	843 (98.5%)	125 (93.3%)	12.11
Because of race	22 (2.2%)	13 (1.5%)	9 (6.7%)	(< 0.001)
Experienced Discrimination for Any Reason				
At least once	571 (54.8%)	468 (51.9%)	103 (73%)	21.09
Never	471 (45.2%)	433 (48.1%)	38 (27%)	(< 0.001)
People were Afraid of You				
At least once	103 (9.9%)	82 (9.1%)	21 (15%)	4.03
Never	935 (90.1%)	816 (90.9%)	119(85%)	(0.036)

Table 1 (cont.)

Summary Statistics, and Chi-squared Tests of Independence between the Subject Characteristics and Moderate to Severe Depression

<i>Characteristic</i>	<i>Total Sample n(%)</i>	<i>PHQ-9 No Depression n(%)</i>	<i>PHQ-9 Moderate to Severe Depression n(%)</i>	<i>Chi- Square</i>
Treated Disrespectfully				
At least once	415 (39.9%)	336 (37.4%)	79 (56%)	16.83
Never	624 (60.1%)	562 (62.6%)	62 (44%)	(< 0.001)
Received Poor Service				
At least once	284 (27.4%)	237 (26.4%)	47 (33.8%)	3.00
Never	754 (72.6%)	662 (73.6%)	92 (66.2%)	(0.083)
Treated Like You Weren't Smart				
At least once	232 (22.7%)	169 (19.1%)	63 (46.3%)	48.11
Never	788 (77.3%)	715 (80.9%)	73 (53.7%)	(< 0.001)
Discrimination Scale				
Less than 0.4 (median)	427 (42.2%)	394 (44.9%)	33 (24.4%)	19.20
Greater than or equal to 0.4 (median)	586 (57.8%)	484 (55.1%)	102 (75.6%)	(< 0.001)

relationship ($p < 0.001$), with high school education or less ($p < 0.001$), and living in poverty ($p = 0.001$). Low instrumental ($p < .001$) and emotional social support ($p < 0.001$), low neighborhood cohesion scores ($p < 0.001$), low social neighborhood scores (i.e., sum of aesthetics, safety, and violence; $p = 0.001$), low physical neighborhood scores (i.e., sum of walkability and food environment; $p < 0.001$), and perceived unfair treatment were also associated with moderate to severe depression ($p < 0.001$).

Adjusted Logistic Regressions

In a logistic model which controlled for gender, age, education, being in a relationship, high school graduation, and poverty status, several individual-level factors were significantly associated with depression severity. Living in poverty ($OR = 2.90$; 95%CI: 1.80, 4.70; $p < 0.01$) increased the odds of moderate to severe depression. Individuals 65 and older ($OR = 1.90$; 95%CI: 1.10, 3.20; $p < 0.05$) had increased odds of moderate to severe depression when com-

pared to individuals aged 18 to 24 years, but education level, relationship status, and gender did not.

Adjusting for all of the above demographic variables, having instrumental ($OR = 0.55$; 95%CI: 0.36, 0.85; $p < 0.05$) and emotional support ($OR = 0.26$; 95%CI: 0.15, 0.44; $p < 0.001$) were both found to be protective factors against moderate to severe depression. Higher perceptions of social cohesion and perceptions of physical and social neighborhood contexts were not significantly associated with moderate to severe depression.

Perceived unfair treatment was not significantly associated with moderate to severe depression, however perception of racism was ($OR = 3.30$; 95%CI: 1.20, 9.20; $p < 0.05$). In an item-by-item analysis of each scale item of the perceived unfair treatment with depression, two of the five items were individually significantly associated with depression severity. Feeling threatened or hassled ($OR = 3.30$; 95%CI: 1.80, 6.00; $p < 0.001$) and feeling like people treated them as not smart ($OR = 1.80$; 95%CI: 1.10, 3.00; $p < 0.05$) increased the odds of reporting moderate to severe depression.

Discussion

The purpose of this study was to examine the social and contextual factors correlated with depression among residents living in a micropolitan city in a rural state. About 14% of the sample met criteria for moderate to severe depression (MDS), which is fairly high in comparison to other samples from both metropolitan and rural communities. For example, Shim et al. (2011) observed a rate of approximately 8% of NHANES respondents meeting criteria for MDS. Kroenke et al. (2009) observed a national rate of 9% using BRFSS data. The findings from

this study showed similar demographic and social correlates of depression in a community-wide micropolitan sample as have been found in studies in small rural and metropolitan samples.

Demographic Factors

Living in poverty was significantly and consistently associated with greater odds of reporting higher levels of depression severity. This finding is similar to previous research that found higher rates of poverty and depression in rural and micropolitan communities (Probst et al., 2006; Weaver et al., 2015). Additionally, older age was associated with depression severity, which is particularly important considering that micropolitan cities tend to have larger elderly communities (Jones et al., 2007; Rogers, 2000; Semuels, 2016).

Social Support

Instrumental and emotional support were associated with lower depression risk. Micropolitan areas may face threats to instrumental support between residents due to out-migration of long-term residents and immigration of new residents. Many rural areas are “graying” as young people leave for perceived better opportunities (Rogers, 2000; Semuels, 2016), which may damage existing social networks and social capital (Alston, 2016). Social support and neighborhood perceptions may mediate the relationship between neighborhood structure (i.e., socioeconomic status, residential stability, and neighborhood disorder) and poor mental health (Hill & Maimon, 2013).

Although lack of emotional support was associated with depression, survey participants reported higher rates of adequate emotional support compared to instrumental

Table 2

Logistic Regression Examining the Effect on the Odds Ratio Corresponding to Having Moderate to Severe Depression (Response Variable) Due to Psychosocial and Perceived Environmental Factors after Adjusting for Demographic Variables (Covariates).

<i>Variable</i>	<i>Odds Ratio (95% C.I.)</i>
In a Relationship	0.77 (0.49, 1.20)
High School or More	0.65 (0.37, 1.10)
At or Below Poverty	2.90 (1.80, 4.70)***
Age	
18-24 (reference)	
25-44	0.68 (0.26, 1.80)
45-64	1.50 (0.75, 2.80)
65+	1.90 (1.10, 3.20)**
Female	1.50 (0.94, 2.40)
Instrumental Social Support	0.55 (0.36, 0.85)**
Emotional Social Support	0.26 (0.15, 0.44)***
Neighborhood Social	0.99 (0.54, 1.80)
Physical Neighborhood	0.68 (0.43, 1.10)
Social Cohesion	0.86 (0.48, 1.50)
Unfair Treatment Scale	1.60 (0.44, 5.80)
Discriminated because of race	3.30 (1.20, 9.20)**
Experienced discrimination at least once	0.82 (0.20, 3.30)
People were afraid of you	0.89 (0.45, 1.80)
Threatened or hassled you	3.30 (1.80, 6.00)***
Treated disrespectfully	0.83 (0.46, 1.50)
Received poor service	0.69 (0.41, 1.20)
Treated like you weren't smart	1.80 (1.10, 3.00)**

Note. * p-value < 0.1; ** p-value < 0.05; ***p-value < 0.001

support. Research suggests that geographic distance may not be as disruptive for people due to reliance on social media and communication technology (Alencar, 2017; Bacigalupe & Cámara, 2012; Dekker & Engbersen, 2014; Viruell-Fuentes & Schultz, 2009). For example, the use of Facebook or other forms of face-to-face chat platforms can maintain social ties between family and friends from a distance. The research in this area has tended to focus on immigrants, but future work might also examine how the people left behind in rural flight might benefit as well. Other researchers have found that digital communication marginally affects how individuals maintain relationships (Mok et al., 2010). However, Viruell-Fuentes and Schultz (2009) also found that when social connections are small or strained, instrumental support suffers.

Unfair Treatment and Discrimination

Research has found that perceived unfair treatment and discrimination can have adverse effects on mental and physical health outcomes across racial/ethnic groups and by socioeconomic status (Paradies, 2006; Pascoe & Smart Richman, 2009; Schmitt et al., 2014; Williams et al., 2012; Williams & Mohammed, 2009). Keene and Padilla (2010; 2014) advanced the theory that stereotypes associated with where one lives could result in discrimination by others. Specifically, that spatial stigma impacts health indirectly via quantity and quality of services available in stigmatized neighborhoods or places, as well as identity formation, stress, and coping. Building on Keene's work, Duncan et al. (2016), Thomas (2016), and Lichter and Shaft (2016), among others, have found a persistent association between rural or low-income stigma and health outcomes. Nevertheless, further research is required to assess the direct and indirect effects of spatial stigma in rural communities, in particular

those areas that are stigmatized by class and rural status.

Future Directions

Although little research has been conducted to examine rural stigma, it is a well-known stereotype held by urban and rural residents alike reinforcing negative narratives about intelligence and other important characteristics. Future work in rural or micropolitan areas should explore the potential role of rural spatial stigma in the health and well-being of rural residents. This study suggests a link between rurality and health for a mostly white sample, but it cannot be known if this protects or harms non-whites in rural areas.

A second important area of research should focus on the out-migration of young rural whites and the in-migration of young Latino workers into these areas. Many rural and micropolitan cities across the Midwest and the South have experienced both processes over the last two decades (Lichter, 2012), but little is known about how this might affect social support structures and mental health for new residents and for those left behind.

Limitations

There are several important limitations to this study. The sample over-represented white, female, older residents, potentially threatening generalizability. Although originally designed to over-sample Latino residents, we were unable to reach a large enough sample to make statistical comparisons. Also, as a cross-sectional study it would be difficult to assign causality between these factors and depression. It is possible that being depressed makes individuals more susceptible to perceived unfair treatment and more sensitive to inadequacies in social support. As this study was not designed to

examine rural stigma, this also limits the strength of assertions that stigma is associated with depression, only that people experience some form of unfair treatment. In addition, the perceived unfair treatment scale was not designed to be used in rural or primarily white samples, potentially confounding our hypotheses related to discrimination and depression.

Implications for Health Behavior Research

Our study highlights the complexity of micropolitan areas for the study and promotion of health. Micropolitan areas in rural states are complex social environments that warrant closer examination. These areas experience the challenges and changes that many rural areas have confronted for decades in addition to the sociodemographic and economic challenges that urban and suburban areas across the US face. Studying mental health severity in a micropolitan community allowed us to demonstrate that individual, social, and community factors are related in complex ways and should be carefully considered when designing and implementing health behavior and health promotion interventions. We highlight two major factors associated with mental health severity in micropolitan communities, infrastructural implications for access to healthcare and health behaviors, and the role of rural stigma on mental health.

Typically approaches to mental health focus on individual-level interventions, however through a public health lens there are strategies that can be used to address mental health at a community level. The results of this study and numerous others suggest some of the burden of mental health arises from community-level factors, in this case economic and social pressures on local migration and negative stereotypes and narratives portrayed about residents (rural-

based stigma). Thus, approaching mental health from a social-ecological perspective is warranted.

We recommend that public health researchers utilize pragmatic designs, combine quantitative and qualitative methods of research, and actively engage with community members to determine what factors and processes are relevant and important to address. We should strive for external validity, so our findings can be informative to other researchers and increase our knowledge while balancing internal validity in order to investigate, answer relevant questions, and inform issues of interest from the community members we engage with in the process of research. We must uncover the nuances and complexities that drive the disparities of mental health among residents of micropolitan communities.

Practitioners must consider increased efforts to adapt these programs, ideally with local input, and in consideration of local constraints. Assuming that interventions and programs that work in other settings would work in micropolitan settings may limit their ability to reach and effectively impact their community. In particular, the ways that perceived discrimination interacts with local context (i.e., perceptions of rurality, social supports and networks, etc.) may not be accounted for in health-related programs developed elsewhere.

The message for policymakers should emphasize the unique effects these factors (i.e., single industry economies, spatial stigma, geographic isolation, older demographics, etc.) have in community-wide mental health efforts of micropolitan residents. Local policies that influence these factors, will also impact mental health. For example, policies that address neighborhood disorder may increase feelings of positive well-being. Policy interventions may prove

difficult in micropolitan areas given financial constraints.

Conclusion

Mental health has typically been the focus of clinical individual- and group-level interventions. However, there is a growing evidence showing the link between community-wide factors and risk for poor mental health that could be affected by public health and policy interventions. Micropolitan communities present a unique challenge to addressing mental health in communities. For example, they may not have large operating budgets to make environmental changes, they tend to have older residents, and they often depend on one or two major employers which are managed from outside of the community. Expanding the concept of spatial stigma to rural contexts may provide some additional complexity to the mental health of micropolitan residents as well. These factors point to a unique set of factors that require new or better adaptation of existing programs, policies, and interventions to address community-wide mental health.

Acknowledgments

This journal article is a product of a Health Promotion and Disease Prevention Research Centers supported by Cooperative Agreement Number (U48DP006389) from the Centers for Disease Control and Prevention. The findings and conclusions in this journal article are those of the author and do not necessarily represent the official position of the Centers for Disease Control and Prevention. The authors have no conflicts of interest to report, financial or otherwise.

References

Alencar, A. (2017). Refugee integration and social media: A local and experiential

perspective. *Information, Communication & Society*, 21(11), 1588-1603.

<https://doi.org/10.1080/1369118X.2017.1340500>

Alston, M. (2016). 'You don't want to be a check-out chick all your life': The out-migration of young people from Australia's small rural towns. *Australian Journal of Social Issues*, 39(3), 299-313.

<https://doi.org/10.1002/j.1839-4655.2004.tb01178.x>

Bacigalupe, G., & Cámara, M. (2012). Transnational families and social technologies: Reassessing immigration psychology. *Journal of Ethnic and Migration Studies*, 38(9), 1425-1438.

<https://doi.org/10.1080/1369183X.2012.698211>

Bennett, K.J., Yuen, M., Blanco-Silva, F. (2018). Geographic differences in recovery after the Great Recession. *Journal of Rural Studies*, 59, 111-117.

<https://doi.org/10.1016/j.jrurstud.2018.02.008>

Breslau, J., Marshall, G. N., Pincus, H. A., & Brown, R. A. (2014). Are mental disorders more common in urban than rural areas of the United States? *Journal of Psychiatric Research*, 56, 50-55.

<https://doi.org/10.1016/j.jpsychires.2014.05.004>

Brossart, D. F., Wendel, M. L., Elliott, T. R., Cook, H. E., Castillo, L. G., & Burdine, J. N. (2013). Assessing depression in rural communities. *Journal of Clinical Psychology*, 69(3), 252-263.

<https://doi.org/10.1002/jclp.21949>

Center for Behavioral Health Statistics and Quality. (2016). Key substance use and mental health indicators in the United

- States: Results from the 2015 National Survey on Drug Use and Health (HHS Publication No. SMA 16-4984, NSDUH Series H-51).
<https://www.samhsa.gov/data/>
- Choenarom, C., Williams, R. A., & Hagerty, B. M. (2005). The role of sense of belonging and social support on stress and depression in individuals with depression. *Archives of Psychiatric Nursing, 19*(1), 18–29.
<https://doi.org/10.1016/j.apnu.2004.11.003>
- Cutrona, C. E., Russell, D. W., Brown, P. A., Clark, L. A., Hessling, R. M., & Gardner, K. A. (2005). Neighborhood context, personality, and stressful life events as predictors of depression among African American women. *Journal of Abnormal Psychology, 114*(1), 3–15.
<https://doi.org/10.1037/0021-843X.114.1.3>
- Dekker, R., & Engbersen, G. (2014). How social media transform migrant networks and facilitate migration. *Global Networks, 14*(4), 401-408.
<https://doi.org/10.1111/glob.12040>
- Diez Roux, A. V. (2002). Invited commentary: Places, people, and health. *American Journal of Epidemiology, 155*(6), 516-519.
<https://doi.org/10.1093/aje/155.6.516>
- Duncan, D. T., Ruff, R. R., Chaix, B., Regan, S. D., Williams, J. H., Ravenell, J., Bragg, M. A., Ogedegbe, G., & Elbel, B. (2016). Perceived spatial stigma, body mass index and blood pressure: A global positioning system study among low-income housing residents in New York City. *Geospatial Health, 11*(2), 164-173.
<https://doi.org/10.4081/gh.2016.399>
- Echeverría, S., Diez-Roux, A. V., Shea, S., Borrell, L. N., & Jackson, S. (2008). Associations of neighborhood problems and neighborhood social cohesion with mental health and health behaviors: The Multi-Ethnic Study of Atherosclerosis. *Health & Place, 14*(4), 853-865.
<https://doi.org/10.1016/j.healthplace.2008.01.004>
- Griffiths, K. M., & Christensen, H. (2007). Internet-based mental health programs: A powerful tool in the rural medical kit. *Australian Journal of Rural Health, 15*(2), 81–87.
<https://doi.org/10.1111/j.1440-1584.2007.00859.x>
- Hill, T. D., & Maimon, D. (2013). Neighborhood context and mental health. In C. S. Aneshensel, J. C. Phelan, & A. Bierman (Eds.), *Handbook of the sociology of mental health* (pp. 479–501). New York, NY: Springer Science + Business Media.
- Ingram, D.D., & Franco, S.J. (2014). NCHS urban-rural classification scheme for counties. National Center for Health Statistics (U.S.), ed. *Vital & Health Statistics, Series 2*, 166.
<https://stacks.cdc.gov/view/cdc/22467>
- Institute of Medicine (US). Committee on Assuring the Health of the Public in the 21st Century. (2002). *The Future of the Public's Health in the 21st Century*. Washington, DC: National Academies Press.
<https://www.ncbi.nlm.nih.gov/books/NBK221245/>
- Jones, C. A., Kandel, W., & Parker, T. (2007). Population dynamics are changing the profile of rural areas. *Journal of Rural Mental Health, 31*(3), 46–53.

<https://doi.org/10.1037/h0095944>

Jordan, M. (2012, November 8). Heartland draws Hispanics to help revive small towns. *The Wall Street Journal*. <https://www.wsj.com/articles/SB10000872396390443696604577645500654098514>

Keene, D. E., & Padilla, M. B. (2010). Race, class and the stigma of place: Moving to “opportunity” in Eastern Iowa. *Health & Place*, 16(6), 1216–1223. <https://doi.org/10.1016/j.healthplace.2010.08.006>

Keene, D. E., & Padilla, M. B. (2014). Spatial stigma and health inequality. *Critical Public Health*, 24(4), 392–404. <https://doi.org/10.1080/09581596.2013.873532>

Kim, E. K. (2013, April 12). Hispanics help revive heartland town in Iowa. *Today*. <https://www.today.com/news/hispanics-help-revive-heartland-town-iowa-1C9319682>

Krieger, N., Smith, K., Naishadham, D., Hartman, C., & Barbeau, E. M. (2005). Experiences of discrimination: Validity and reliability of a self-report measure for population health research on racism and health. *Social Science & Medicine*, 61(7), 1576–1596. <https://doi.org/10.1016/j.socscimed.2005.03.006>

Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. *Psychiatric Annals*, 32(9), 509–515. <https://doi.org/10.3928/0048-5713-20020901-06>

Kroenke, K., Spitzer, R. L., & Williams, J. B. W. (2001). The PHQ-9: Validity of a brief depression severity measure. *Journal of General Internal Medicine*, 16(9), 606–613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>

Kroenke, K., Strine, T. W., Spitzer, R. L., Williams, J. B. W., Berry, J. T., & Mokdad, A. H. (2009). The PHQ-8 as a measure of current depression in the general population. *Journal of Affective Disorders*, 114(1), 163–173. <https://doi.org/10.1016/j.jad.2008.06.026>

Letvak, S. (2002). The importance of social support for rural mental health. *Issues in Mental Health Nursing*, 23(2), 249–261. <https://doi.org/10.1080/016128402753542992>

Lichter, D. T. (2012). Immigration and the new racial diversity in rural America. *Rural Sociology*, 77(1), 3–35. <https://doi.org/10.1111/j.1549-0831.2012.00070.x>

Lichter, D. T., & Schafft, K. A. (2016). People and places left behind: Rural poverty in the new century. In D. Brady, & L. M. Burton (Eds.), *The Oxford handbook of the social science of poverty*. Oxford, England, UK: Oxford University Press. <https://doi.org/10.1093/oxfordhb/9780199914050.013.15>

Mair, C., Diaz Roux, A. V., Shen, M., Shea, S., Seeman, T., Echeverria, S., & O'meara, E. S. (2009). Cross-sectional and longitudinal associations of neighborhood cohesion and stressors with depressive symptoms in the multiethnic study of atherosclerosis. *Annals of Epidemiology*, 19(1), 49–57.

<https://doi.org/10.1016/j.annepidem.2008.10.002>

Mok D., Wellman B., Carrasco J. (2010). Does distance matter in the age of the Internet? *Urban Studies*, 47(13), 2747–2783.

<https://doi.org/10.1177/0042098010377363>

Mujahid, M. S., Diez Roux, A. V., Morenoff, J. D., & Raghunathan, T. (2007). Assessing the measurement properties of neighborhood scales: From psychometrics to ecometrics. *American Journal of Epidemiology*, 165(8), 858-867.

<https://doi.org/10.1093/aje/kwm040>

Mujahid, M. S., Diez Roux, A. V., Shen, M., Gowda, D., Sanchez, B., Shea, S., Jacobs, D. R., & Jackson, S. A. (2008). Relation between neighborhood environments and obesity in the Multi-ethnic Study of Atherosclerosis. *American Journal of Epidemiology*, 167(11), 1349-1357.

<https://doi.org/10.1093/aje/kwn047>

Ozby, F., Johnson, D. C., Dimoulas, E., Morgan, C. A., Charney, D., & Southwick, S. (2007). Social support and resilience to stress: from neurobiology to clinical practice. *Psychiatry (Edgmont)*, 4(5), 35–40.

Paradies, Y. (2006). A systematic review of empirical research on self-reported racism and health. *International Journal of Epidemiology*, 35(4), 888-901.

<https://doi.org/10.1093/ije/dyl056>

Paradies, Y., Ben, J., Denson, N., Elias, A., Priest, N., Pieterse, A., Gupta, A., Kelaher, M., Gee, G. (2015). Racism as a determinant of health: A systematic review and meta-analysis. *PLoS ONE*, 10(9), e0138511.

<https://doi.org/10.1371/journal.pone.0138511>

Pascoe, E. A., & Smart Richman, L. (2009). Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin*, 135(4), 531–554.

<https://doi.org/10.1037/a0016059>

Probst, J. C., Laditka, S. B., Moore, C. G., Harun, N., Powell, M. P., & Baxley, E. G. (2006). Rural-urban differences in depression prevalence: Implications for family medicine. *Family Medicine*, 38(9), 653–660.

R Core Team. (2017). R: A language and environment for statistical computing. *R Foundation for Statistical Computing*, Vienna, Austria.

<http://www.R-project.org/>

Raffaelli, M., Andrade, F. C., Wiley, A. R., Sanchez-Armass, O., Edwards, L. L., & Aradillas-Garcia, C. (2013). Stress, social support, and depression: A test of the stress-buffering hypothesis in a Mexican sample. *Journal of Research on Adolescence*, 23(2), 283-289.

<https://doi.org/10.1111/jora.12006>

Rogers, C. C. (2000, Winter). The graying of rural America. *Forum for Applied Research and Public Policy*, 15(4), 52-55.

Rubin, D. B. (1987) Multiple imputation for nonresponse in surveys. Wiley Series in Probability and Mathematical Statistics. Applied Probability and Statistics. New York, NY: Wiley.

Rural Health Information Hub. (2017). Population in mental health HPSAs (health professional shortage areas) for metro and non metro counties, 2017. <https://www.ruralhealthinfo.org/charts/8>

- Rural Migration News. (2013, January). Midwest: Hispanic migrants. *Rural Migration News*, 19(1).
<https://migration.ucdavis.edu/rmn/more.php?id=1728>
- Schmitt M. T., Branscombe N. R., Postmes T., & Garcia A. (2014). The consequences of perceived discrimination for psychological well-being: A meta-analytic review. *Psychological Bulletin*, 140(4), 921–948.
<https://doi.org/10.1037/a0035754>
- Schulz, A. J., Gravelle, C. C., Williams, D. R., Israel, B. A., Mentz, G., & Rowe, Z. (2006). Discrimination, symptoms of depression, and self-rated health among African American women in Detroit: Results from a longitudinal analysis. *American Journal of Public Health*, 96(7), 1265–1270.
<https://doi.org/10.2105/AJPH.2005.064543>
- Samuels, A. (2016, June 2). The graying of rural America. *The Atlantic*.
<https://www.theatlantic.com/business/archive/2016/06/the-graying-of-rural-america/485159/>
- Shim, R. S., Baltrus, P., Ye, J., & Rust, G. (2011). Prevalence, treatment, and control of depressive symptoms in the United States: Results from the National Health and Nutrition Examination Survey (NHANES), 2005-2008. *The Journal of the American Board of Family Medicine*, 24(1), 33–38.
<https://doi.org/10.3122/jabfm.2011.01.100121>
- Silver, E., Mulvey, E. P., & Swanson, J. W. (2002). Neighborhood structural characteristics and mental disorder: Faris and Dunham revisited. *Social Science & Medicine*, 55(8), 1457–1470.
[https://doi.org/10.1016/S0277-9536\(01\)00266-0](https://doi.org/10.1016/S0277-9536(01)00266-0)
- Strogatz, D. S., & James, S. A. (1986). Social support and hypertension among blacks and whites in a rural, southern community. *American Journal of Epidemiology*, 124(6), 949-956.
<https://doi.org/10.1093/oxfordjournals.aje.a114484>
- Takizawa, T., Kondo, T., Sakihara, S., Ariizumi, M., Watanabe, N., & Oyama, H. (2006). Stress buffering effects of social support on depressive symptoms in middle age: Reciprocity and community mental health. *Psychiatry and Clinical Neurosciences*, 60(6), 652-661.
<https://doi.org/10.1111/j.1440-1819.2006.01579.x>
- Thomas, G.M. (2016). ‘It’s not that bad’: Stigma, health, and place in a post-industrial community. *Health & Place*, 38, 1-7.
<https://doi.org/10.1016/j.healthplace.2015.12.001>
- United States Census Bureau. (2017a). Quick facts: Iowa.
<https://www.census.gov/quickfacts/IA>
- United States Census Bureau. (2017b). Quick facts: Ottumwa City, Iowa.
<https://www.census.gov/quickfacts/fact/table/ottumwacityiowa/PST045216>
- United States Department of Labor, Bureau of Labor Statistics. (2017). Iowa unemployment rates.
<https://www.iowa.gov/chart/unemployment-rates>
- van Buuren, S. (2018). *Flexible imputation of missing data* (2nd ed.). New York, NY: Chapman and Hall.

- Viruell-Fuentes, E. A., & Schulz, A. J. (2009). Toward a dynamic conceptualization of social ties and context: Implications for understanding immigrant and Latino health. *American Journal of Public Health, 99*(12), 2167-2175.
<https://doi.org/10.2105/AJPH.2008.158956>
- Weaver, A., Himle, J. A., Taylor, R. J., Matusko, N. N., & Abelson, J. M. (2015). Urban vs rural residence and the prevalence of depression and mood disorder among African American women and non-Hispanic white women. *Journal of the American Medical Association Psychiatry, 72*(6), 576–583.
<https://doi.org/10.1001/jamapsychiatry.2015.10>
- Williams, D. R., & Mohammed, S. A. (2009). Discrimination and racial disparities in health: Evidence and needed research. 20-47. *Journal of Behavioral Medicine, 32*(1), 47. <https://doi.org/10.1007/s10865-008-9185-0>
- Williams, D. R., John, D. A., Oyserman, D., Sonnega, J., Mohammed, S. A., & Jackson, J. S. (2012). Research on discrimination and health: An exploratory study of unresolved conceptual and measurement issues. *American Journal of Public Health, 102*(5), 975–978.
<https://doi.org/10.2105/AJPH.2012.300702>
- Williams, D. R., Yu, Y., Jackson, J. S., & Anderson, N. B. (1997). Racial differences in physical and mental health: Socio-economic status, stress and discrimination. *Journal of Health Psychology, 2*(3), 335-351.
<https://doi.org/10.1177/135910539700200305>
- World Health Organization. (2018, March 22). Depression.
<http://www.who.int/en/news-room/fact-sheets/detail/depression>