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A multilevel analysis of association between neighborhood social capital and depression: Evidence from the first South African National Income Dynamics Study

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Abstract

Background—As neuropsychiatric disorders account for a great proportion of the total burden of disease in sub-Saharan Africa, depression is rapidly emerging as a public health issue in South Africa. Given the divisions enforced by a legacy of the apartheid spatial and economic policies, features of communities such as neighborhood-level social capital may play a critical role in depression. However, the extent to which neighborhood-level social capital is associated with depression in South Africa at the population-level is unknown.

Methods—Data from the first wave of the South African National Income Dynamics Study (SA-NIDS) was used to examine the association between the neighborhood-level social capital and individual depression using multilevel regression models.

Results—There was a negative association between neighborhood-level social capital and depression score with social trust and neighborhood preference accounting for this association. Structural social capital, namely civic participation, was not related to depression. Individual predictors, including social class, self-rated health status and education, were strong covariates of depression.

Limitations—The cross-sectional design of the study limits our understanding of the temporal order of social capital and depression.

Conclusions—In post-apartheid South Africa, low social capital remains an important social determinant of health, including depression outcome. This is in addition to individual determinants related to class such as unemployment, education and social class which play an important role in influencing depression. Further research utilizing a longitudinal study design is warranted to examine the association between social capital and depression in South Africa.

Keywords

Depression; Social capital; South Africa; Apartheid; Multilevel analysis

Conflict of interest

All authors declare that they have no conflicts of interest.

1. Introduction

Over the last decade there has been growing research on contextual factors, such as features of neighborhood, and their impact on individual health outcomes. Social capital – the features of social structure such as norms, trusts, and networks that can facilitate collective action for mutual benefit (Coleman, 1990; Putnam, 1993) – is considered an important determinant of health, including mental health. Systematic reviews point to social capital being an important factor in improving mental health (De Silva et al., 2005), particularly in low-income countries (De Silva et al., 2007).

The burden associated with mental health conditions is a serious issue in sub-Saharan Africa (Lopez et al., 2006) and depression in particular is increasingly recognized as a pressing public health concern in South Africa (Ardington and Case, 2010; Tomlinson et al., 2009). While a number of recent studies point to an association between social capital and depression (Aslund et al., 2010; Jung et al., 2012; Kouvonen et al., 2008; O'Connor et al., 2011; Oksanen et al., 2010), evidence from low- and middle-income countries (LAMICs) is limited. There is also little research examining subtypes of social capital at both neighborhood- and individual-level in relation to depression. Lastly, the legacy of apartheid's racially and geographically segregated communities in South Africa provides a unique opportunity to examine the important role of neighborhood in relation to mental health outcomes. Many challenges of the post-apartheid era still remain, as reflected in housing policies that promote the development of new houses in existing neighborhoods, thereby enhancing rather than dismantling the apartheid urban spatial legacy (Bradlow et al., 2011). In the current study, we examined the association between neighborhood-level social capital and individual depression outcome using a multilevel regression modeling technique.

2. Methods

2.1. Data source

Data (version 4) from the first wave of the South African National Income Dynamics Study (SA-NIDS) was used to examine the association between neighborhood social capital and individual depression outcome. SA-NIDS is the first longitudinal panel survey of a nationally representative sample of households in South Africa. Wave 1 of the study was carried out in 2008 by the Southern Africa Labour and Development Research Unit, University of Cape Town. The data became publically available in 2009. The first wave of SA-NIDS involved approximately 16,800 adults from 7300 households across 400 primary sampling units. There are two separate questionnaires in the SA-NIDS: the adult and household questionnaires, available in 11 official languages of South Africa. The adult questionnaire was administered to every household member aged 15 or older. Using a non-randomized method, the household questionnaire was administered to the oldest woman in the household or to another household member knowledgeable about living arrangements. The latter questionnaire captures information relevant to household issues. The sampling methods and response rates are detailed in the SA-NIDS technical report (Leibbrandt et al., 2009); the overall individual level non-response rate being 6.7% and overall household level non-response rate being 31%.

2.2. Measures

The primary health outcome of the study was depression status which was assessed using the self-reported 10-item version scale of the Center for Epidemiologic Studies Depression (CES-D) scale available in the adult questionnaire of SA-NIDS. CES-D, frequently used in studies in South Africa (Hamad et al., 2008; Myer et al., 2008), was designed to measure depressive symptoms in the general population (Radloff, 1977). The 10 item scale correlates well with the original 20 item version with little loss of psychometric properties (Shrout and

Yager, 1989). The depression score was the sum of the scores of the 10 items, which ranges from 0 to 30. CES-D score was treated as a continuum of psychological distress (Steffick, 2000), with the level of depression increasing with increasing score. The alpha value of CES-D-10 was .75, consistent with another study (Cole et al., 2004).

Neighborhood-specific social capital, the main predictor of our study, was assessed using four variables in the SA-NIDS Household questionnaire: (1) support network and reciprocity, (2) association activity, (3) collective norm and values, and (4) safety. The nature of support networks and reciprocity was assessed with the question, "How common is it that neighbors help each other out?" Association activity was assessed with the question "How common is it that neighbors do things together?" To these two questions, respondents rated on a 5-point scale, with 1 being never happens, and 5 being very common. Collective norms and values were assessed with the question, "How common is it that people in your neighborhood are aggressive?" Safety was assessed with the question, "How common is burglary and theft in your neighborhood". Respondents rated these two questions on a 5-point scale, with 1 being very common, and 5 being never happens. The social capital score was the total from the above four questions, with higher score reflecting higher social capital. Social capital was aggregated across households to create a neighborhood social capital score (ranged from 9 to 19), this being categorized into three groups: low (9–12), moderate (13–15) and high (16–19).

Two individual-level social capital predictors used in the SA-NIDS adult questionnaire were civic participation and social trust. Civic participation was assessed based on respondent's participation in any of 18 association/groups and is an example of an objectively verifiable structural dimension of social capital which refers to what people do (Harpham, 2008). Social trust is a subjective example of cognitive social capital which refers to what people feel (Harpham, 2008). The latter was assessed by the question, "Imagine you lost a wallet or purse that contained R200 and it was found by someone who lives close by" requiring a response on a 3-point scale (1 being very likely and 3 being not likely at all to be returned with the money in it). The study included a question regarding individual preference to remain in the neighborhood; this being considered a moderator of the relationship between neighborhood social capital and health outcomes (Carpiano, 2008), incorporating an important aspect of neighborhood integration (Morrow, 1999) and a connection to networks that possess resources (Bourdieu, 1986).

A number of individual demographic, socioeconomic, and health-related covariates were utilized from the SA-NIDS adult questionnaire including: gender, race, marital status, employment, educational attainment, age group, social class, and current health status. For social class, respondents were categorized using a six-point scale, with 1 being the lowest and 6 being the highest social class. Health status required respondents to rate their overall health on a five-point scale, with 1 being excellent, and 5 being poor.

2.3. Data analyses

Multilevel models were used to analyze the association between neighborhood social capital indicators and individual depression outcome, and involved two levels: individual and neighborhood. Four random intercept models were sequentially fitted. Model 1 was a null model with only the constant term in the fixed and random parts. Model 2 provided the effect of individual-level predictors on depression outcome without individual-level social capital indicators. Model 3 examined the effect of all individual predictors on depression. Model 4 was the full model that considered all explanatory variables at individual and neighborhood levels. All models were adjusted by the post-stratification weight as estimated by Wittenberg (2009), as the SA-NIDS is survey data to match the population estimates produced by Statistics South Africa for the mid-year population estimates for 2008 for

population distribution of provinces and households. Model-fit statistics using AIC (Akaike, 1974) were established as well as estimates of variance and the intra-class correlation coefficient which explains the proportion of total variance at individual and neighborhood level. The data were analyzed using STATA version 12 (StataCorp, 2011).

3. Results

The crude depression scores were stratified by gender, population group, and age group in a published study (Ardington and Case, 2010). Table 1 provides the results based on 13,469 (81%) of the 16,657 adult respondents. The mean depression score of adult individuals in our study was 7.9 out of a score of 30. Over half of the sample were female (56%), the largest age group was 35–59 years (35%), and 51% were never married. In terms of socioeconomic status, 71% were currently unemployed and 61% completed high school. Most reported excellent (31%) and good overall health (28%). For social capital perceived by the individual, 36% belonged to at least one association or organization and 72% thought a wallet containing R200 would not likely be returned with the money in it if it was found by someone who lived close by. An overview of social capital across 400 communities is provided in Table 1.

The results from the four multilevel models are presented in Table 2. Intra-class correlation analysis from Model 1 indicates that 85% and 15% of variance in depression was explained by individual and neighborhood-level differences respectively. Model 2 suggests that gender, age, economic rung, marital status, educational attainment, employment and health status seem to influence depression. Model 3 suggests that lower social trust was significantly associated with higher depression, while higher preference to remain in the neighborhood was significantly associated with lower depression, controlling for individual demographic characteristics from Model 2. Participation in civic organizations was not associated with depression. Model 4, a full model controlling for all explanatory variables, indicated that neighborhoods with high social capital were significantly associated with lower depression scores in residents. Social trust and neighborhood preference were significant predictors of depression but civic participation was not. Among the four models, model 4 had the most appropriate fit based on lowest AIC.

4. Discussion

Utilizing data from SA-NIDS, this study has shown that neighborhood social capital was associated with individual depression outcome (Model 4). In addition, our finding (Model 3) suggests that individual level social capital, particularly social trust, also influence individual depression, in addition to many demographic predictors (Model 2). When comparing Models 1 and 3, the neighborhood variance declined, suggesting that variation found in Model 1 was explained by differences in the individual- and neighborhood-level predictors. Our findings are consistent with other studies which found that individual-level low neighborhood attachment (O'Brien et al., 1994) and social trust (De Silva et al., 2005; Fujiwara and Kawachi, 2008), are significant risk factor for depression.

Our study did not find a significant association between civic participation (an example of structural social capital) and depression. As indicated in a systematic review (De Silva, 2006), structural social capital may not always be positively associated with mental health outcomes. Separate studies also reported that civic participation had no impact on depression outcome in their study (Mitchell and LaGory, 2002; Veenstra, 2005). Importantly, legacies of apartheid neighborhoods still remain a reality in South Africa (Schensul and Heller, 2010) where it is argued class is gradually replacing race as the major manifestation of inequality (Seekings and Nattrass, 2005). We believe our study lends support to this statement:

individual determinants such as social class, education and unemployment, in addition to characteristics of neighborhood, still matter.

Major strengths of this study include: the large, nationally representative sample; as well as the analysis that takes the hierarchical nature of the data into consideration by using multilevel analysis and controlling for important confounders (including individual-level social capital, socioeconomic status and self-rated health status.) Our study has several limitations. Firstly, the cross-sectional nature of our study means it could be susceptible to selection bias, as depression could cause people to live in neighborhoods with low social capital. Secondly, the neighborhood-specific social capital information was collected from the household questionnaire which was administered to the oldest woman or another household member with knowledge about the living arrangements of the household. The lack of variation here in demographic characteristics of respondents (such as age, gender and seniority of household) can systematically bias aggregated neighborhood-level measures. While further research, utilizing a longitudinal study design, is warranted to examine the temporal association between social capital and depression in South Africa, this study has contributed to a better understanding about neighborhood social capital and depression in that country.

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Table 1

Descriptive statistics for 13,469 resident adults across 400 neighborhoods.

Variable	Category	<i>n</i> (%)
<i>Individual level^a</i>		
Gender	Male	5423 (.44)
	Female	8046 (.56)
Population category	Black	10,481 (.78)
	Coloured ^b	1980 (.09)
	Asian/Indian	200 (.02)
	White	808 (.11)
Age	15–20	2738 (.20)
	21–24	1414 (.10)
	25–34	2568 (.24)
	35–59	4911 (.35)
	60+	1838 (.11)
Marital status	Married	3860 (.31)
	Living with partner	1101 (.08)
	Widow	1173 (.07)
	Divorce/Separated	358 (.03)
	Never married	6977 (.51)
Employment	Employed	3338 (.29)
	Unemployed	10,131 (.71)
Education	No education	1786 (.09)
	Did not complete school	8678 (.61)
	Completed high school	3005 (.30)
Health status	Excellent	3827 (.31)
	Very good	3522 (.28)
	Good	3302 (.23)
	Fair	1755 (.11)
	Poor	1063 (.07)
Social class	Rung 1(lowest)	2104 (.13)
	Rung 2	5113 (.34)
	Rung 3	4485 (.35)
	Rung 4	1431 (.14)
	Rung 5	282 (.03)
	Rung 6 (highest)	54 (.01)
Neighborhood attachment	Strong preference to stay	8311 (.58)
	Moderate preference to stay	1930 (.15)
	No preference to stay	1427 (.13)
	Moderate preference to leave	809 (.06)
	Strong preference to leave	992 (.08)
Social trust	High	1345 (.13)

Variable	Category	<i>n</i> (%)
Civic participation	Medium	1948 (.15)
	Low	10,176 (.72)
	No	8653 (.64)
	Yes	4816 (.36)
<i>Neighborhood level^c</i>		
Neighborhood social capital	Low (9–12)	52 (.13)
	Moderate (13–15)	322 (.80)
	High (16–19)	26 (.07)

^aPercentage results are weighted using post-stratification weights.

^bThe term ‘coloured’ is used by Statistics SA.

^c400 neighborhoods with social capital score range between 9 and 19.

Table 2Results for the multilevel linear regression model ($N = 13,469$).

Variable	Model 1, SE	Model 2, SE	Model 3, SE	Model 4, SE
<i>Individual level</i>				
Gender: (Male)				
Female		.46(.08) ***	.46(.08) ***	.46(.08) ***
Age: (15–20)				
21–24		1.34(.14) ***	1.34(.14) ***	1.34(.14) ***
25–34		1.54(.14) ***	1.57(.14) ***	1.57(.14) ***
35–59		1.56(.16) ***	1.67(.16) ***	1.67(.16) ***
60+		.97(.21) ***	1.12(.21) ***	1.13(.21) ***
Population category: (White)				
Black		1.77(.30) ***	1.68(.29) ***	1.70(.29) ***
Coloured		.70(.36) **	.67(.35)	.67(.35)
Asian/Indian		.86(.88)	.84(.83)	.82(.83)
Marital status: (Married)				
Living with partner		.22(.20)	.17(.19)	.17(.20)
Widow		1.09(.20) ***	1.10(.20) ***	1.10(.20) ***
Divorce/Separated		1.73(.32) ***	1.71(.32) ***	1.71(.32) ***
Never married		.40(.13) ***	.36(.13) ***	.36(.13) ***
Employment: (Employed)				
Unemployed		.48(.11) ***	.53(.11) ***	.54(.11) ***
Education: (No education)				
Did not complete school		-.35(.16) **	-.40(.15) ***	-.40(.14) ***
Completed high school		-.80(.18) ***	-.89(.18) ***	-.91(.18) ***
Health status: (Excellent)				
Very good		.58(.13) ***	.51(.12) ***	.52(.12) ***
Good		.97(.15) ***	.92(.15) ***	.92(.15) ***
Fair		1.74(.18) ***	1.71(.17) ***	1.70(.17) ***
Poor		3.55(.25) ***	3.50(.24) ***	3.49(.24) ***
Social class: (Rung 1–Lowest)				
Rung 2		-.92(.19) ***	-.88(.19) ***	-.88(.19) ***
Rung 3		-1.29(.19) ***	-1.22(.19) ***	-1.22(.19) ***
Rung 4		-1.42(.23) ***	-1.39(.23) ***	-1.39(.23) ***
Rung 5		-1.67(.37) ***	-1.64(.35) ***	-1.64(.35) ***
Rung 6		-2.01(.58) ***	-2.03(.60) ***	-2.03(.59) ***
Neighborhood attachment: (No preference to stay)				
Strong preference to stay			-.73(.16) ***	-.72(.16) ***

Variable	Model 1, SE	Model 2, SE	Model 3, SE	Model 4, SE
Moderate preference to stay			-.25(.19)	-.25(.19)
Moderate preference to leave			-.27(.22)	-.28(.22)
Strong preference to leave			.76(.25) ***	.76(.25) ***
Social trust: (High)				
Medium			.82(.21) ***	.83(.22) ***
Low			.25(.19)	.25(.19)
Civic participation: (No)				
Yes			-.03(.09)	-.03(.09)
<i>Neighborhood level:</i>				
Social capital: (High)				
Moderate				.82(.35) **
Low				.99(.39) ***
Variance components:				
Level 2 variance, σ^2 (SE)	3.34(.27)	2.15(.20)	2.18(.20)	2.61(.23)
Level 2 intra-class correlation	.15	.11	.11	.11
Model fit				
AIC	79,056	77,482	77,339	77,337

Reference category is in bracket. All regression results are using post-stratification weights. The regression is across 400 neighborhoods. All SE are reported as robust SE.

**
p .05.

p .01.