A multilevel analysis of the relationship between depression and perceived neighborhood violence and safety: Evidence from the South African National Income Dynamics Study

Andrew Tomita[1], Charlotte A. Labys[2], and Jonathan K.Burns[2]

[1]Columbia University, Mailman School of Public Health

[2]University of KwaZulu-Natal, Nelson R Mandela School of Medicine

Introduction

With deep roots of violence dating back to the apartheid era[1], this troubled history persists today for what many would consider to be a potentially epidemic and overwhelming challenge for post-apartheid South Africa. As the country undergoes the dramatic economic and political transition from apartheid to non-racial democracy, violence and unintentional injuries together are some of the leading causes of death and lost disability-adjusted life years[2]. Often described as one of the most violent countries in Africa, South Africa's homicide rate stands at 30.9 per 100,000 populations in 2011-2012[3]. While researchers have recognized the effects of community violence[4] and fear of crime[5] on mental health outcomes, the extent of this relationship at the population-level is unknown in South Africa. Therefore, the purpose of this study was to investigate the relationship between perceptions of neighborhood violence and depression in South Africa.

Methods

This study analyzed publicly-available data from the second wave of the South African National Income Dynamics Study (SA-NIDS). The SA-NIDS is a longitudinal panel survey of a nationally representative sample of households in South Africa. Initiated in 2010, the second wave of the study (version 2) involved the successful interviewing of approximately 6,800 households[6], with nearly 18,400 adult residents aged 15 years old and older representing a continuing sample across 400 primary sampling areas. A stratified, two-stage cluster sample design was used with the second wave of interviews. The survey consisted of two components: household questionnaires were administered

by trained fieldworkers to the oldest woman in the household or to another household member knowledgeable about his/her living arrangements; adult questionnaires were administered to every consenting household member aged 15 or older.

Depression outcome was assessed using the 10-item version of the Center for Epidemiologic Studies Depression Scale[7] (CES-D) from the adult questionnaire. Study participants were asked how often they experienced symptoms associated with depression during the past week by choosing from four possible responses in a Likert format. The depression score was the sum of scores for the 10 items (Cronbach's alpha = 0.73) with a total score of 10 or more indicating the presence of depressive symptoms[8]. The main covariate of our study, perceived neighborhood violence and safety, was assessed using 6 items, each scored with a five-point Likert format (Cronbach's alpha = 0.89) from the household questionnaire. The perceived neighborhood violence and safety composite score was based on the sum of scores for the 6 items. Greater total scores in CES-D as well as perceived neighborhood violence and safety reflected higher levels of depressive symptoms and perception of violence, crime and poor safety respectively. Following a descriptive analysis, a multilevel mixed-effects regression model -- adjusted for socio-demographic and health status factors -- was used to examine the association between perceived neighborhood violence and safety and depression outcome. Similar to the first wave method[9], descriptive analysis and regression models were adjusted using the study's post-stratification weight from second wave to match the population estimates produced by Statistics South Africa for the 2010 mid-year population estimates[10].

Results

Based on the demographic characteristics for the resulting 12,799 adult resident study participants, over half were female (53.9%) and the mean age was 36.8 years old. The largest racial/ethnic group was Black African (78.1%), over half (53.9%) were never married, and 59.5% of the study participants completed at least a high school equivalent level of education. Approximately one fifth (21.1%) had CES-D scores of 10 or higher, and 10.3% of household resided in urban

informal areas, with the mean neighborhood violence and safety score being 16.9 (range: 6-30). The above proportion results were adjusted using post-stratification weight method.

The results of the adjusted multilevel regression models indicated that increased perceived neighborhood violence and safety were associated with higher CES-D scores (adjusted OR=1.04, $p<0.01$). Study participants who were older, black, female, non-married, less educated, informal urban household residents, and in poorer self-reported general health were significantly associated with higher depression in the adjusted regression model.

Discussion

Utilizing a nationally representative sample of households in South Africa, our study found that a higher perception in neighborhood violence and safety was associated with higher level of depression. As South Africa gradually transitions to non-racial democracy, legacies of apartheid neighborhoods[11] and memories of violence persist, creating one of the most challenging public mental health concerns to its people. Reductions in income inequality have made little meaningful strides since the end of apartheid with class-based inequality appearing to gradually replace race-based inequality[12]. Nevertheless, individual determinants such as race/ethnicity, in addition to social determinants, are still highly pertinent given the mental health disparities found among certain racial/ethnic groups in our study. The results indicated that black African study participants were several times more likely (adjusted OR=4.08, $p<0.01$) to exhibit depressive symptoms compared to white participants in the adjusted regression model.

While the strength of this study includes the use of a large, nationally representative household sample with an emphasis on the hierarchical nature (individual- and household level) of the data, there are several limitations. Firstly, our study design was cross-sectional; therefore, we could not establish temporality in relation to neighborhood violence and depression rates. Secondly, individual-level responses to perception of neighborhood violence were not available. Perception of neighborhood violence was based on the response of the oldest woman or another household member with

knowledge about the living arrangements, potentially resulting in selection bias. Further research utilizing a longitudinal study design is warranted to examine the association of time on neighborhood violence and depression in South Africa.

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