Published in final edited form as:

J Poverty. 2017 ; 21(1): 80–96. doi:10.1080/10875549.2016.1262933.

Measurement of Neighborhood Context in an Urban Cohort of HIV-infected or at risk Low-Income Women

Jane K. Burke-Miller, PhD^a, Kathleen Weber, RN, BSN^b, Susan E. Cohn, MD^c, Ronald C. Hershow, PhD^d, Beverly Sha, MD^e, Audrey L. French, MD^{b,e}, and Mardge H. Cohen, MD^{f,e}

^aHektoen Institute of Medicine, 2240 W. Ogden Ave, 2nd Floor, Chicago IL 60612 USA

^bRuth M. Rothstein CORE Center, Cook County Bureau of Health Services, 2020 W. Harrison St., Chicago IL 60612 USA

^cNorthwestern University Feinberg School of Medicine, 420 E. Superior St., Chicago IL 60611 USA

^dUniversity of Illinois at Chicago School of Public Health, 1601 W. Taylor St., Chicago IL 60612 USA

^eRush University Medical Center, 600 S. Paulina St., Chicago IL 60612 USA

^fStroger Hospital, Cook County Bureau of Health Services, Chicago IL 60612 USA

Abstract

The study of neighborhood disadvantage and health relies on census socioeconomic data but would benefit from reliable survey measures of factors that influence health within low income communities. The Perceptions of Neighborhood Environment Scale (PNES) was developed for use in the general U.S. population, and its measurement properties in a cohort of low-income urban women living with or at risk for HIV are described. The scale and all but one subscale have good psychometric and econometric reliability, as well as convergent, construct, and concurrent validity, and are not collinear with household and community area income in low-income urban neighborhoods.

Keywords

HIV/AIDS; gender; poverty measurement; HLM; survey research

Place or residential neighborhood has become central to the study of social determinants of health and health disparities (Krieger et al., 2005; Poundstone et al., 2004; U.S. Department of Health and Human Services, 2011; Diez-Roux, 2008; Berkman & Kawachi, 2003), including policies and interventions targeting neighborhoods and health (Braveman et al, 2011). The influence of where people live on their health, independent of individual factors, is well established in areas such as chronic disease morbidity and mortality, cardiovascular disease, mental illness, birth outcomes, infant health, HIV transmission risk, and racial

health disparities (Berkman & Kawachi, 2003; Diez-Roux, 2007; Latkin et al., 2013; LaVeist et al., 2011).

A consistent finding has been the negative effect of racial segregation and concentrated poverty as measured by U.S. Census statistics (Acevedo-Garcia et al., 2003; Kershaw et al., 2011; Williams & Collins, 2001). Although readily available, such aggregate Census measures are not based on theoretical models and provide limited information regarding neighborhood effect pathways (Diez-Roux, 2008; Latkin et al., 2013; Sampson & Graif, 2009). In addition, aggregate census data by nature applies homogenous values such as poverty or deprivation to local areas that may be heterogeneous in meaningful ways such as social capital and community resilience (Snowden & Yamada, 2005). Improvement of neighborhood context measures would enable social epidemiology to move from a focus on the intersection of race, poverty, and locality in relationship to health and on to examining local area variations among distressed or at risk populations thereby identifying processes that may be amenable to community-based interventions (Geronimus, 2000; Poundstone et al., 2004; Latkin et al., 2013). To date, non-census based neighborhood measurement methodology has been limited and inadequately reported, hindering cross-study comparisons and measurement refinement (Diez-Roux & Mair, 2010; Merlo et al., 2009; Pruitt et al., 2010; Pruchno et al., 2011).

A number of U.S. neighborhood studies have focused on Chicago, Illinois, a city that is well-suited for neighborhood studies for several reasons. Importantly for researchers, Chicago is divided into 77 community areas which, although mostly assigned by sociologists in the 1920's (Venkatesh, 2001), are well-recognized and used by residents to identify their neighborhoods (Sampson & Graif, 2009). Chicago also is among the top "hypersegregated" metropolitan areas in the nation in terms of concentration and isolation of African Americans (Massey, 2001), many of whom live in areas of severe urban poverty (Geronimus, 2000). Public health research has shown Chicago Black-White and low income-high income health disparities to be considerable and growing (Silva et al., 2001; Orsi et al., 2010). The negative health effects of Chicago neighborhood racial segregation, concentrated poverty and lack of access to healthy foods is an ongoing problem for the city (Place Matters for Health in Cook County, 2012).

Chicago also is home to a pioneer in neighborhood research, the Project on Human Development in Chicago Neighborhoods (PHDCN) which has developed measures for neighborhood level constructs such as social cohesion and physical disorder (Sampson, Morenoff and Gannon-Rowley, 2002). Using PHDCN data, Raudenbush and Sampson proposed a methodology for understanding the "psychometric properties of ecological measures," called ecometrics (Raudenbush and Sampson, 1999; Raudenbush, 2003) and set forth methodologies for assessing ecometric scale reliability, validity and dimensionality. To date, the use of these techniques is rarely reported in the literature (Merlo et al., 2009; Mujahid et al., 2007; Pruchno et al., 2011; Pruitt et al., 2010).

Refining health and place research has two needs: first, to develop and validate health-specific neighborhood measures rather than relying on more general Census data; and second, to develop empirical data on the pathways by which neighborhoods influence health

(Diez-Roux, 2007; Diez-Roux & Mair, 2010; Pruchno et al., 2011; Sampson & Graif, 2009). In response to the first problem, the Perceptions of Neighborhood Environment Scale (PNES) was developed as an alternative to census-based data. The PNES has been shown to be associated with health outcomes such as obesity (Auchincloss et al., 2013), depressive symptoms, cigarette smoking and drinking (Echeverria et al., 2008), diabetes (Auchincloss et al., 2009), hypertension (Mujahid et al., 2011), cortisol circadian rhythms (Do et al., 2011), inflammatory markers (Nazmi et al., 2010) and arthritis (Martin et al., 2010). Prior studies have published information about the psychometric and econometric properties of the PNES in a large population-based general adult sample (n=5,988) (Mujahid et al., 2007) and in a small sample of Latino and African American adults (n=48) (Echeverria et al., 2004).

The primary aim of this study is to report on the psychometric and econometric properties of a health-specific neighborhood measure (the Perceptions of Neighborhood Environment Scale (PNES)) and its subscales in a population of low-income mostly minority urban women living with and at risk for HIV/AIDS in and around Chicago. We hypothesize that the analysis will establish the multilevel validity and reliability of the PNES with measurement properties similar to other populations, and that the PNES captures neighborhood characteristics that are distinct from census socioeconomic status.

METHODS

Study Population

The Women's Interagency HIV Study (WIHS) is an on-going multicenter cohort study of the treated and natural history of HIV-seropositive and at-risk HIV-uninfected women in the United States (Barkan et al., 1998). The Chicago WIHS Consortium includes 4 clinical sites in the city. The PNES was administered to all Chicago cohort participants as part of the structured research interview at one study visit which took place between April and September 2012.

Measures

The PNES (see Appendix) is a 36-item scale consisting of 7 neighborhood dimensions, including: aesthetic quality (6 items); physical activity/walking environment (10 items); availability of healthy food (4 items); safety (3 items); violence (4 items); social cohesion (4 items); and activities with neighbors (5 items). Development and properties of the subscales in a general adult sample and pilot of Latino and African American adults are described by Echeverria et al. (2004), and Mujahid et al. (2007). For most domains, item responses range from 1 (strongly agree) to 5 (strongly disagree). Responses for the violence and activities with neighbors domains range from 1 (often) to 4 (never).

Characteristics of respondents were obtained from the WIHS research protocol at the same study visit as the PNES. Participants' residential addresses were geocoded using ArcGIS 10.0 into established Chicago community areas (CAs); suburban townships or municipalities also were considered to be community areas.

Social and economic compositional characteristics of CA's were obtained from the U.S. Census American Community Survey estimates for 2011. Characteristics were selected

based on a review of commonly used area-based socioeconomic and demographic measures (Cramer et al., 2008) and include: median household income; percent of population with income below federal poverty level; percent unemployed adults ages 16–64; and percent African American (non-Hispanic).

Statistical Analysis

The psychometric properties of the total scale and each subscale were assessed by Cronbach's alpha coefficient. This is the traditional approach to evaluating scale reliability in single level data (Nunnally & Bernstein, 1994). The ecometric reliability of the scales was assessed by intraclass correlation coefficient (ICC) (Singer & Willett, 2003), calculated from unconditional neighborhood models. The ICC is an estimate of the amount of variability in the scale score between geographic areas, and it can be interpreted as the amount of correlation in the data due to the grouping (i.e., where people live). The ICC can range from 0 to 1, with higher values indicating greater agreement between respondents within a geographic area. Ecometric analyses are based on average aggregated individual survey responses at the neighborhood or area estimate rather than empirical Bayes estimates (Mujahid et al., 2008) to facilitate cross-study comparisons.

We examined the ecometric convergent validity of the PNES scale and domains in terms of their correlation with each other and with characteristics drawn from public use Census data. We tested whether differences in PNES scores were associated with individual respondent characteristics, and how much variance would be explained by community area poverty. These two-level models included individual level covariates (HIV status, age, race, education, income and employment) and the U.S. Census measure of the percent of neighborhood residents living below federal poverty level. Finally, since prior research has consistently demonstrated that individual symptoms of depression are associated with neighborhood characteristics (Ahern & Galea, 2011; Mair et al., 2009; Truong & Ma, 2006) we assessed concurrent validity of the PNES and subscales as predictors of depressive symptomatology in multilevel mixed effects regression models.

RESULTS

The PNES was completed by 91% (292/320) of Chicago WIHS cohort participants with a study visit; reasons for non-completion included incomplete study visit (N=21), language barrier (N=6), and refusal (N=1). Women residing outside of Chicago or the counties contiguous to Chicago (n=25) were excluded from this analysis because of their wide geographic dispersal, resulting in an analysis population of 267 women. The geographic regions represented in the analysis include the city of Chicago (urban Cook County) which is made up of 77 community areas, and suburban Cook County and 4 contiguous "collar counties" made up of numerous townships or municipalities (community areas). Women resided in 91 CAs, with an average of 7 women per CA, (s.d. = 6, median = 5, minimum-maximum = 1–22).

Characteristics of women and CA's are shown in Table 1. Most women live within the city of Chicago (76%) and the rest live in surrounding suburbs and counties. In the sample, 73.8% of women were known to be HIV positive, and the remainder at behavioral risk for

HIV exposure. Women in the study had poorer socioeconomic characteristics than the average for the CAs in which they reside. Federal poverty level (FPL) for 2012 was \$11,170 for an individual. Among WIHS women, 57% of women had household incomes below \$12,000 (also the median income), while 18.3% of CA households had incomes below FPL (median income = \$53,369). The residential areas represented in the sample were also generally worse off than the state of Illinois average, which has a median annual income of \$56,576 and 13.1% of the population living below FPL.

About two-thirds of women had at least a high school level of education (66.3%) compared to a CA average of 83.2%. WIHS women are generally older than their communities, with a median age of 46.8 years, compared to 35.2 years in CAs. Most women in the WIHS sample (62.9%) were not working; unfortunately, it is unknown how many of the WIHS women are actually out of the labor force rather than meeting the census definition of unemployed (looking for work). The average CA unemployment rates was 8.2%

Almost 80% of WIHS women are African American, although African Americans make up 42.5% of CA populations. Conversely, only 11.6% of WIHS women are white, although whites represent 44.5% of CA populations. There are also fewer Hispanic/Latina women in the WIHS sample (8.2%) than in the CA's that they live in (18.8%).

By definition, WIHS participants are women, but they live in census tracts and CAs that are about half female (53.3%). All WIHS women live in areas defined as urban by Census population density criterion of at least 2,500 residents per census tract.

Descriptive and psychometric statistics for the PNES and domains are shown in Table 2. Few data were missing, although 4 women skipped all violence items: 2 noted that they don't know how often violence occurred in their neighborhood. The total scale had a mean of 3.2 of a total possible of 4.7. Among the domains scored on a 5-point scale, neighborhood aesthetic and physical activity were rated highest (mean of 3.5 each) followed by social cohesion (mean of 3.3), availability of healthy foods (mean of 3.1), and safety was rated lowest (mean of 2.8). In the 4-point domains, absence of violence was rated slightly higher (mean of 2.8) than activities with neighbors (mean of 2.5).

The total scale reliability was good with a Cronbach's alpha of .94. In general, the domain subscale reliabilities also were good with 5 of the 7 having alphas between .84 and .89. Physical activity had a reliability alpha of .80 which would have increased to .83 with the removal of two items, both regarding traffic and the only two items not reversed in the subscale. The domain with the lowest reliability (Cronbach's alpha = .72) was availability of healthy foods; removal of the fast food item would have improved the alpha to .94.

CA intraclass correlation coefficients were non-zero for the scale and all subscales except activities with neighbors: total scale ICC= .28; aesthetic ICC= .20; physical/walking ICC= .34; healthy foods ICC= .22; safety ICC= .24; violence ICC= .17; and social cohesion ICC= .09.

We assessed the convergent validity of the total scale and subscales by examining CA level zero-order correlations among the PNES and its subscales and census and other public use

measures (Table 3). Not surprisingly given the good reliability of the total PNES, the domains were significantly correlated with each other ($p<.001$). There were strong correlations between scores on aesthetic quality and physical/walking environment (.84), aesthetic quality and safety (.78), safety and physical/walking environment (.80), safety and violence (.70), safety and social cohesion (.74), and physical/walking environment and social cohesion (.70). Activities with neighbors had the lowest correlations with other scales ($<.50$) with the exception of being moderately correlated with social cohesion (.63).

Among the census and public use measures, percent of the CA below federal poverty level (FPL) had the strongest and most consistent negative correlations with the PNES indicating that respondents in higher concentrated poverty CA's assessed their neighborhoods more negatively. Correlations with percent FPL ranged in strength from $-.64$ for violence to $-.36$ for social cohesion, except for activities with neighbors which was not significant. Percent unemployment and proportion of Black residents were both negatively correlated with PNES scores except on the domain of activities with neighbors. Conversely, median household income was positively associated with PNES measures.

We looked for systematic variation in the PNES scale and domains in relationship to individual characteristics grouped by CA in 2 level models (Table 4). Of the individual covariates, age and income were most often significantly ($p<.05$) associated with PNES scores, with older than median respondents (≥ 47 years) rating total scale, aesthetic quality, violence, and social cohesion in their neighborhood more positively, and lower than median income respondents (household income $< \$12,000/\text{year}$) rating total scale, healthy food and social cohesion less positively. HIV positive women rated the safety and violence in their neighborhoods more positively than the at-risk women. Black women rated neighborhood access to healthy food less positively than others and more educated women (high school or higher) rated neighborhood violence more positively. There were no significant associations between individual characteristics and ratings of activities with neighbors.

The 2 level models were run again with the Census measure of percent of the CA living below FPL (in 10% increments), which was significantly ($p<.05$) and negatively related to all PNES scores except activities with neighbors. Controlling for individual covariates, CA poverty explained about half the between neighborhood variability of PNES total, aesthetic, physical activity, and healthy food scores (39%–60%), 27% of the variability in violence scores, 15% of the variability in safety scores, and only 8% of social cohesion variability. Activities with neighbors had no between CA variance.

Finally, we used the PNES and subscales as predictors of depressive symptomatology among women, in multilevel linear regression models adjusting for HIV status, age, race/ethnicity, education, employment and income (Table 5). The total scale and aesthetic, physical environment, violence, and social cohesion subscales were all significantly ($p<.05$) associated with lower depressive symptoms. Healthy food, safety and activities with neighbors were not significantly related to depression.

DISCUSSION

The aim of this study was to report on the psychometric and econometric properties of a health-specific neighborhood measure (the Perceptions of Neighborhood Environment Scale (PNES)) and its subscales in a population of low-income mostly minority urban women living with or at risk for HIV. Respondents in the sample were generally lower income and less well educated than the average for the community areas in which they resided. In addition, the residential areas represented in the sample were more economically deprived than the average in the state of Illinois. Nonetheless, the PNES and 6 of its 7 subscales demonstrated acceptable psychometric and econometric properties including reliability, validity and dimensionality, and PNES variance was not solely explained by local area poverty levels.

PNES reliability as assessed by Cronbach's alpha was generally good in our sample, ranging from .72–.94. This is similar to the reliabilities reported by Echeverria and colleagues (2004) in a small pilot of mostly low-income and female African American and Latino adults of comparable age living in New York City. Using a representative random sample of almost 6,000 adults living in Baltimore, MD, Forsyth County, NC, and New York City, Mujahid et al. (2007) reported slightly lower but still acceptable subscale Cronbach's alphas which ranged from .73–.83. It may be that because the PNES assesses neighborhood health related problems, it is better suited to assessing low-income urban areas than in less poor and non-urban populations such as was used by Mujahid and colleagues.

In our study, the availability of healthy foods subscale had the lowest reliability with a Cronbach's alpha of .72. This would have been much higher without the item on availability of fast food in the neighborhood. The dimension works as a whole, but availability of fast food and absence of healthy food may be two distinct dimensions rather than one, and can also be measured by directly observation or public use data (Ma et al., 2013; Moore et al., 2012). The violence subscale had the most missing data, with two participants indicating they didn't know how to respond to the items. Unlike most of the other dimensions, this subscale uses a 4 point "how often" scale rather than a 5 -point "agree to disagree" scale. Given its strong correlation with the safety domain, future PNES users might explore combining violence and safety into a 5-point scale. Having all subscales on the same subjective metric also would facilitate comparisons across subscales.

Our analysis showed the PNES to have good econometric measurement properties with the exception of the activities with neighbors subscale, with moderate to strong ICC's of .09 to .34. This is comparable to those reported by Raudenbush & Sampson for similar neighborhood measures (1999), and slightly lower than the .24–.46 reported by Mujahid et al. (2007) for the PNES subscale ICC's associated with census clusters, which are smaller than the CAs examined in this study. Although it has good psychometric properties, the activities with neighbors scale did not perform well as an econometric measure. Mujahid et al. (2007) found the same in their much larger and more geographically diverse sample, and concluded that the measure is an individual level construct that is not differentiated by neighborhood.

There was convergent validity among the PNES subscales in keeping with previous reports (Echeverria et al., 2004; Mujahid et al., 2007), indicating that the dimensions are related, as would be expected in differing aspects of neighborhood disorder. In addition, the PNES and all subscales except activities with neighbors were significantly and negatively correlated with CA concentrated poverty, unemployment and racial segregation, contributing to the validity of the scale in identifying problems associated with local area poverty. The very strong correlation between aesthetic and physical activity domains suggest that these may be so closely aligned that they could be combined into a single measure of built environment or neighborhood disorder. Since the PNES was developed to assess neighborhood characteristics that are relevant to cardiovascular disease, specific items related to physical activity (e.g., availability of exercise facilities) could be dropped from such a built environment scale.

In general, individual characteristics included in the models were not strong or consistent predictors of PNES measures with the exception of age and household income. Mujahid et al. (2007) also found older age and household income to be associated with more positive neighborhood environment assessments, but in their data race/ethnicity had associations not found in our more racially homogenous sample. The individual age and income associations likely reflect within local area compositional heterogeneity rather than systematic individual variation in responding to the PNES (Mujahid et al., 2007; Subramanian et al., 2003). CA poverty (FPL) was strongly and negatively associated with the PNES and its subscales (except activities with neighbors), and explained a considerable amount but less than half of the between CA variance in the PNES measures. There were observed variations in the PNES among CAs that were not simply explained by differences in socioeconomic status (i.e. poverty level), further supporting the dimensionality and validity of the PNES as a meaningful neighborhood measure.

Finally, our findings were consistent with prior research establishing significant relationships between symptoms of depression as measured by the CES-D and other measures and neighborhood aesthetic quality and violence (Mair et al., 2009), collective efficacy (Ahern & Galea, 2011; Mair et al., 2009), and other measures of neighborhood physical and social disorder and (Truong & Ma, 2006).

Notable limitations of the study are the small sample size, inconsistent and small number of respondents in each geographic area, and non-representative sampling. When using the PNES as neighborhood level predictor of health outcomes, it is preferable to use empirical Bayes estimates which borrow power across neighborhoods and adjust low-powered areas toward the overall sample mean rather than crude means (Diez-Roux, 2007; Mujahid et al. 2008).

CONCLUSION

The PNES can be used to identify heterogeneity in health-related factors across low-income urban neighborhoods that is not available in census data. The subscale on activities with neighbors should be excluded; the violence and safety subscales should be combined into one domain with a consistent scale; and availability of healthy food could be measured

separately from availability of fast food. The subscales of aesthetic and physical environment could be combined into a measure of neighborhood disorder and the number of items reduced. Health-related neighborhood measures such as the PNES can provide research on community poverty and health the opportunity to move beyond identification of place-based disparities and on to examining local area variations within distressed or at risk populations, thereby identifying processes amenable to community-based interventions.

Acknowledgments

Data in this manuscript were collected by the Women's Interagency HIV Study (WIHS). The contents of this publication are solely the responsibility of the authors and do not represent the official views of the National Institutes of Health (NIH). WIHS (Principal Investigators): UAB-MS WIHS (Michael Saag, Mirjam-Colette Kempf, and Deborah Konkle-Parker), U01-AI-103401; Atlanta WIHS (Ighovwerha Ofotokun and Gina Wingood), U01-AI-103408; Bronx WIHS (Kathryn Anastos), U01-AI-035004; Brooklyn WIHS (Howard Minkoff and Deborah Gustafson), U01-AI-031834; Chicago WIHS (Mardge Cohen), U01-AI-034993; Metropolitan Washington WIHS (Mary Young), U01-AI-034994; Miami WIHS (Margaret Fischl and Lisa Metsch), U01-AI-103397; UNC WIHS (Adaora Adimora), U01-AI-103390; Connie Wofsy Women's HIV Study, Northern California (Ruth Greenblatt, Bradley Aouizerat, and Phyllis Tien), U01-AI-034989; WIHS Data Management and Analysis Center (Stephen Gange and Elizabeth Golub), U01-AI-042590; Southern California WIHS (Alexandra Levine and Marek Nowicki), U01-HD-032632 (WIHS I – WIHS IV). The WIHS is funded primarily by the National Institute of Allergy and Infectious Diseases (NIAID), with additional co-funding from the Eunice Kennedy Shriver National Institute of Child Health and Human Development (NICHD), the National Cancer Institute (NCI), the National Institute on Drug Abuse (NIDA), and the National Institute on Mental Health (NIMH). Targeted supplemental funding for specific projects is also provided by the National Institute of Dental and Craniofacial Research (NIDCR), the National Institute on Alcohol Abuse and Alcoholism (NIAAA), the National Institute on Deafness and other Communication Disorders (NIDCD), and the NIH Office of Research on Women's Health. WIHS data collection is also supported by UL1-TR000004 (UCSF CTSA) and UL1-TR000454 (Atlanta CTSA).

Appendix: Perceptions of Neighborhood Environment Scale domains and items

Aesthetic quality Scale is 1–5, strongly agree to strongly disagree with 5 being most positive perception.

- A1. There is a lot of trash and litter on the street in my neighborhood
- A2. There is a lot of noise in my neighborhood
- A3. In my neighborhood the buildings and homes are well-maintained (Reversed (R))
- A4. The buildings and houses in my neighborhood are interesting (R)
- A5. My neighborhood is attractive (R)
- A6. There are interesting things to do in my neighborhood (R)

Walking environment/Physical activity

- B1. My neighborhood offers many opportunities to be physically active (R)
- B2. Local sports clubs and other facilities in my neighborhood offer many opportunities to get exercise (R)
- B3. It is pleasant to walk in my neighborhood (R)
- B4. The trees in my neighborhood provide enough shade (R)
- B5. In my neighborhood it is easy to walk places (R)

B6. I often see other people walking in my neighborhood (R)

B7. I often see other people exercising (for example, jogging, bicycling, playing sports) in my neighborhood (R)

B8. My neighborhood has heavy traffic

B9. There are busy roads to cross when out for walks in my neighborhood

B10. In my neighborhood, the streets and sidewalks are in good condition (R)

Availability of healthy food

C1. A large selection of fresh fruits and vegetables is available in my neighborhood (R)

C2. The fresh fruits and vegetables in my neighborhood are of high quality (R)

C3. A large selection of low-fat products is available in my neighborhood (R)

C4. There are many opportunities to purchase fast foods in my neighborhood

Safety

D1. I feel safe walking in my neighborhood, day or night (R)

D2. Violence is not a problem in my neighborhood (R)

D3. My neighborhood is safe from crime (R)

Violence Scale is 1–4, often to never, with 4 being most positive perception.

E1. During the past 6 months, how often was there a fight in your neighborhood in which a weapon was used?

E2. During the past 6 months, how often were there gang fights in your neighborhood?

E3. During the past 6 months, how often was there a sexual assault or rape in your neighborhood?

E4. During the past 6 months, how often was there a robbery or mugging in your neighborhood?

Social cohesion

F1. People around here are willing to help their neighbors (R)

F2. People in my neighborhood generally get along with each other (R)

F3. People in my neighborhood can be trusted (R)

F4. People in my neighborhood share the same values (R)

Activities with neighbors Scale is 1–4, often to never, with 4 being most positive perception.

G1. About how often do you and people in your neighborhood do favors for each other? By favors, we mean such things as watching each other's children, helping with shopping, lending garden or house tools, and other small acts of kindness (R)

- G2. When a neighbor is not at home or on vacation, how often do you and other neighbors watch over their property? (R)
- G3. How often do you and other people in the neighborhood ask each other for advice about personal things such as child-rearing or job openings? (R)
- G4. How often do you and people in your neighborhood have parties or other get-togethers where other people in the neighborhood are invited? (R)
- G5. How often do you and other people in your neighborhood visit in each other's homes or speak with each other on the street? (R)

References

- Acevedo-Garcia, D., Lochner, KA. Residential segregation and health. In: Kawachi, I., Berkman, LF., editors. *Neighborhoods and Health*. New York: Oxford University Press Inc.; 2003. p. 265-287.
- Ahern J, Galea S. Collective efficacy and major depression in urban neighborhoods. *American Journal of Epidemiology*. 2011; 173(12):1453–1462. [PubMed: 21527512]
- Auchincloss AH, Diez-Roux AV, Mujahid MS, Shen M, Bertoni AG, Carnethon MR. Neighborhood resources for physical activity and healthy foods and incidence of type 2 diabetes mellitus. *Archives of Internal Medicine*. 2009; 169(18):1698–1704. [PubMed: 19822827]
- Auchincloss AH, Mujahid MS, Shen M, Michos ED, Whitt-Glover MC, Diez-Roux AV. Neighborhood health-promoting resources and obesity risk (the Multi-Ethnic Study of Atherosclerosis). *Obesity*. 2013; 21:621–628. [PubMed: 23592671]
- Barkan SE, Melnick SL, Preston-Martin S, et al. The Women's Interagency HIV Study. WIHS Collaborative Work Group. *Epidemiology*. 1998; 9:117–125. [PubMed: 9504278]
- Berkman, LF., Kawachi, I., editors. *Social Epidemiology*. New York: Oxford University Press Inc.; 2003.
- Braveman PA, Egerter SA, Woolf SH, Marks JS. When do we know enough to recommend action on the social determinants of health? *American Journal of Preventive Medicine*. 2011; 40(1 Suppl 1):S58–66. [PubMed: 21146780]
- Chicago Police Department. *Annual Report 2010: A Year in Review*. Chicago, IL: Chicago Police Department; 2010.
- Cramer, B., Nepaul, A., Osleeb, J., Vias, A. *The Spatial Context of Health Disparities: A Literature Review*. University of Connecticut, Department of Geography; 2008.
- Diez-Roux AV, Nieto FJ, Muntaner C, et al. Neighborhood environments and coronary heart disease: A multilevel analysis. *American Journal of Epidemiology*. 2007; 146:48–63.
- Diez-Roux AV. Next steps in understanding the multilevel determinants of health. *Journal of Epidemiology and Community Health*. 2008; 62:957–959. [PubMed: 18854498]
- Diez-Roux AV, Mair C. Neighborhoods and health. *Annals of the New York Academy of Sciences*. 2010; 1186:125–145. [PubMed: 20201871]
- Do DP, Diez-Roux AV, Hajat A, Auchincloss AH, Merkin SS, Ranjit N, Shea S, Seeman T. Circadian rhythm of cortisol and neighborhood characteristics in a population-based sample: the Multi-Ethnic Study of Atherosclerosis. *Health and Place*. 2011; 17(2):625–632. [PubMed: 21292535]
- Druyts EF, Rachlis B, Lima VD, et al. Mortality is influenced by locality in a major HIV/AIDS epidemic. *HIV Medicine*. 2009; 10(5):274–281. [PubMed: 19210694]
- Echeverria SE, Diez-Roux AV, Link BG. Reliability of self-reported neighborhood characteristics. *Journal of Urban Health*. 2004; 81:682–701. [PubMed: 15466849]
- Echeverria S, Diez-Roux AV, Shea S, Borrell LN, Jackson S. Associations of neighborhood problems and neighborhood social cohesion with mental health and health behaviors: The Multi-Ethnic Study of Atherosclerosis. *Health & Place*. 2008; 14:853–865. [PubMed: 18328772]

- Gardner EM, McLess MP, Steiner JF, del Rio C, Burman WJ. The spectrum of engagement in HIV care its relevance to test-and-treat strategies for prevention of HIV infection. *Clinical Infectious Diseases*. 2011; 52(6):793–800. [PubMed: 21367734]
- Geronimus AT. To mitigate, resist, or undo: Addressing structural influence on the health of urban populations. *Am J Public Health*. 2000; 90:867–872. [PubMed: 10846503]
- Gibbons RD, Hedeker D, Elkin I, Waternaux C, Kraemer HC, Greenhouse JB, Shea MT, Imber SD, Sotsky SM, Watkins JT. Some conceptual and statistical issues in analysis of longitudinal psychiatric data. *Archives of General Psychiatry*. 1993; 50:739–750. [PubMed: 8357299]
- Harrison KM, Ling Q, Son R, Hall HI. County-level socioeconomic status and survival after HIV diagnosis, United States. *Annals of Epidemiology*. 2008; 18:919–927. [PubMed: 19041591]
- Joint Center for Political and Economic Studies. *Place Matters for Health in Cook County: Ensuring Opportunities for Good Health for All*. Washington, DC: 2012.
- Kawachi, I., Berkman, LF. Social cohesion, social capital and health. In: Kawachi, I., Berkman, LF., editors. *Social Epidemiology*. New York: Oxford University Press; 2003. p. 174-190.
- Kershaw KN, Diez Roux AV, Burgard SA, Lisabeth LD, Mujahid MS, Schulz AJ. Metropolitan-level racial residential segregation and black-white disparities in hypertension. *American Journal of Epidemiology*. 2011; 174(5):537–45. [PubMed: 21697256]
- Krieger N, Chen JT, Waterman PD, Rehkopf DH, Subramanian SV. Painting a truer picture of US socioeconomic and racial/ethnic health inequalities: The Public Health Disparities Geocoding Project. *Am J Public Health*. 2005; 95:312–323. [PubMed: 15671470]
- Latkin CA, German D, Vlahov D, Galea S. Neighborhoods and HIV: A social ecological approach to prevention and care. *American Psychologist*. 2013; 68(4):210–224. [PubMed: 23688089]
- LaVeist T, Pollack K, Thorpe R, Fesahazion R, Gaskin D. Place, not race: disparities dissipate in southwest Baltimore when blacks and whites live under similar conditions. *Health Affairs*. 2011; 30(10):1880–1887. [PubMed: 21976330]
- Ma X, Barnes TL, Freedman DA, Bell BA, Colabianchi N, Liese AD. Test-retest reliability of a questionnaire measuring perceptions of neighborhood food environment. *Health & Place*. 2013; 21:65–69. [PubMed: 23434497]
- Maas B, Fairbairn N, Kerr T, et al. Neighborhood and HIV infection among IDU: Place of residence independently predicts HIV infection among a cohort of injection drug users. *Health & Place*. 2007; 13:432–439. [PubMed: 16798055]
- Mair C, Diez-Roux AV, Shen M, Shea S, Seeman T, Echeverria S, O'Meara ES. Cross-sectional and longitudinal associations of neighborhood cohesion and stressors with depressive symptoms in the Multiethnic Study of Atherosclerosis. *Ann Epidemiol*. 2009; 19:49–57. [PubMed: 19064189]
- Mari Gallagher Research & Consulting Group. *The Chicago 2011 Food Desert Drilldown: 5th Anniversary edition*. Chicago, Illinois: Oct. 2011
- Martin KR, Shreffler J, Schoster B, Callahan LF. Associations of perceived neighborhood environment on health status outcomes in persons with arthritis. *Arthritis Care & Research*. 2010; 62(11):1602–1611.
- Massey, DS. Residential segregation and neighborhood conditions in U.S. metropolitan areas. In: Smelser, NJ, Wilson, WJ., Mitchell, F., editors. *America Becoming: Racial Trends and Their Consequences, Volume I*. Washington, D.C: National Academies Press; 2001. p. 391-434.
- Merlo J, Ohlsson H, Lynch KF, Chaix B, Subramanian SV. Individual and collective bodies: Using measures of variance and association in contextual epidemiology. *Journal of Epidemiology and Community Health*. 2009; 63:1043–1048. [PubMed: 19666637]
- Moore LV, Diez-Roux AV, Franco M. Measuring availability of healthy foods: Agreement between directly measured and self-reported data. *American Journal of Epidemiology*. 2012; 175(10):1037–1044. [PubMed: 22273535]
- Mujahid MS, Diez Roux AV, Morenoff JD, Raghunath T. Assessing the measurement properties of neighborhood scales: From psychometrics to econometrics. *American Journal of Epidemiology*. 2007; 165(8):858–868. [PubMed: 17329713]
- Mujahid MS, Diez-Roux AV, Morenoff JD, Raghunath T, Cooper RS, Ni H, Shea S. Neighborhood characteristics and hypertension. *Epidemiology*. 2008; 19:590–598. [PubMed: 18480733]

- Mujahid MS, Diez Roux AV, Cooper RC, Shea S, Williams DR. Neighborhood stressors and race/ethnic differences in hypertension prevalence (the Multi-Ethnic Study of Atherosclerosis). *American Journal of Hypertension*. 2011; 24(2):187–93. [PubMed: 20847728]
- Nazmi A, Diez-Roux AV, Jenny NS, Tsai MY, Szklo M, Aiello AE. The influence of persistent pathogens on circulating levels of inflammatory markers: a cross-sectional analysis from the Multi-Ethnic Study of Atherosclerosis. *BMC Public Health*. 2010; 10:706–804. [PubMed: 21083905]
- Nunnally, JC., Bernstein, IH. *Psychometric Theory*. 3rd. McGraw-Hill Inc.; 1994.
- Orsi JM, Margellos-Anast H, Whitman S. Black:White Health Disparities in the United States and Chicago: A 15-Year Progress Analysis. *Am J Public Health*. 2010; 100(2):349–56. [PubMed: 20019299]
- Poundstone KE, Strathdee SA, Celentano DD. The social epidemiology of Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome. *Epidemiologic Reviews*. 2004; 26:22–35. [PubMed: 15234945]
- Pruchno RA, Wilson-Genderson M, Cartwright FP. The texture of neighborhoods and disability among older adults. *The Journals of Gerontology, Series B: Psychological Sciences and Social Sciences*. 2011; 67(1):89–98.
- Pruitt SL, Jeffe DB, Yan Y, Schootman M. Reliability of perceived neighbourhood conditions and the effects of measurement error on self-rated health across urban and rural neighbourhoods. *Journal of Epidemiology and Community Health*. 2010; 66:342–351. [PubMed: 21098825]
- Rapiti E, Porta D, Forastiere F, et al. Socioeconomic status and survival of persons with AIDS before and after the introduction of highly active antiretroviral therapy. *Epidemiology*. 2000; 11:496–501. [PubMed: 10955400]
- Raudenbush, SW. The quantitative assessment of neighborhood social environments. In: Kawachi, I., Berkman, L., editors. *Neighborhoods and Health*. New York: Oxford University Press; 2003. p. 112–131.
- Raudenbush SW, Sampson RJ. Ecometrics: Toward a science of assessing ecological settings, with application to the systematic social observation of neighborhoods. *Sociological Methodology*. 1999; 29:1–41.
- Sampson RJ, Graif C. Neighborhood social capital as differential social organization: resident and leadership dimensions. *American Behavioral Scientist*. 2009; 52(11):1579–1605.
- Sampson RJ, Morenoff JD, Gannon-Rowley T. Assessing “neighborhood effects”: Social processes and new directions in research. *Annual Review of Sociology*. 2002; 28:443–478.
- Silva A, Whitman S, Margellos H, Ansell D. Evaluating Chicago’s Success in Reaching the Healthy People 2000 Goal of Reducing Health Disparities. *Public Health Reports*. 2001; 116(5):484–94. [PubMed: 12042612]
- Singer, JD., Willett, JB. *Applied Longitudinal Data Analysis: Modeling Change and Event Occurrence*. New York, NY: Oxford University Press; 2003.
- Snowden L, Yamada A. Cultural differences in access to care. *Annu Rev Clin Psychol*. 2005; 1:143–166. [PubMed: 17716085]
- Subramanian SV, Lochner KA, Kawachi I. Neighborhood differences in social capital: a compositional artifact or a contextual construct? *Health & Place*. 2003; 9:33–44.
- Truong K, Ma S. A systematic review of relations between neighborhoods and mental health. *Journal of Mental Health Policy and Economics*. 2006; 9:137–154. [PubMed: 17031019]
- U.S. Department of Health and Human Services. *Healthy People 2020*. 2011. <http://www.healthypeople.gov/2020/default.aspx>
- Venkatesh SA. Chicago’s Pragmatic Planners: American Sociology and the Myth of Community. *Social Science History*. 2001; 25(2):275–317.
- Whitman S, Silva A, Shah A, Ansell D. Diversity and disparity: GIS and small-area analysis in six Chicago neighborhoods. *Journal of Medical Systems*. 2004; 28(4):397–411. [PubMed: 15366244]
- Williams DR, Collins C. Racial residential segregation: A fundamental cause of racial disparities in health. *Public Health Reports*. 2001; 116:404–416. [PubMed: 12042604]
- Zierler S, Krieger N. Reframing women’s risk: Social inequalities and HIV infection. *Annual Review of Public Health*. 2000; 18:401–436.

Zierler S, Krieger N, Tang Y, Coady W, Siegfried E, DeMaria A, Auerbach J. Economic deprivation and AIDS incidence in Massachusetts. *American Journal of Public Health*. 2000; 90(7):1064–1073. [PubMed: 10897184]

Author Manuscript

Author Manuscript

Author Manuscript

Author Manuscript

Table 1

Characteristics of 267 individual respondents and their residential areas in and around Chicago.

Characteristic	Women N=267	Community Areas N=91
Mean respondents per geographic unit (s.d.)	Not applicable	7 (6)
HIV seropositive	73.8%	Not available
Chicago (vs. surrounding suburbs)	76.0%	53.8%
Median household income, \$	<=\$12,000	\$53,369
% below individual federal poverty level	57.4 (<=\$12K)	18.3 (<=\$11,170/year)
% unemployed (among ages 16–64)	62.9%	8.2%
% High school graduate or higher	66.3%	83.2%
Median age, years	46.8	35.2
% African American or Black	79.8%	42.5%
% White	11.6%	44.5%
% Hispanic/Latina	8.2%	18.8%
% Female	100%	52.6%
% Urban	100%	100%

s.d. = standard deviation

Table 2

Descriptive and psychometric statistics for the Perceptions of Neighborhood Environment total scale and seven domains administered to N=267 women in Chicago and surrounding counties.

Subscale	N subjects ¹	No of items	Possible Range of scores ²	Actual Min-Max	Mean score	Standard deviation	Cron-bach's alpha	Improved Cronbach's alpha if (item) removed
Total scale	267	36	1-4.7	1.6-4.6	3.2	3.2	.94	—
Subscales								
Aesthetic quality	267	6	1-5	1-5	3.5	0.9	.84	—
Physical activity/Walking environment	267	10	1-5	1.5-5	3.5	0.7	.80	.83 (B8, B9)
Availability of healthy foods	267	4	1-5	1-4.75	3.1	0.8	.72	.94 (C4)
Safety	267	3	1-5	1-5	2.8	1.0	.85	—
Violence	263	4	1-4	1-4	2.8	0.9	.89	—
Social cohesion	266	4	1-5	1-5	3.3	0.9	.89	—
Activities with neighbors	266	5	1-4	1-4	2.5	0.8	.85	—

¹ Using at least one item

² Subscales coded so that higher scores mean more positive perception of environment.

Table 3

PNES and public use data characteristics: zero-order correlations aggregated at the community area level (N=91).

	1	2	3	4	5	6	7	8	9	10	11	12
PNES Total (1)	1											
Aesthetic (2)	.90 ^a	1										
Physical Activity (3)	.92 ^a	.84 ^a	1									
Healthy Foods (4)	.66 ^a	.57 ^a	.52 ^a	1								
Safety (5)	.90 ^a	.78 ^a	.80 ^a	.57 ^a	1							
Violence (6)	.75 ^a	.72 ^a	.67 ^a	.51 ^a	.70 ^a	1						
Social Cohesion (7)	.83 ^a	.65 ^a	.70 ^a	.43 ^a	.74 ^a	.51 ^a	1					
Activities with Neighbors (8)	.55 ^a	.33 ^b	.39 ^a	.19	.45 ^a	.09	.63 ^a	1				
% below federal poverty level (9)	-.55 ^a	-.54 ^a	-.45 ^a	-.48 ^a	-.54 ^a	-.64 ^a	-.36 ^b	-.13	1			
Median Household Income (10)	.50 ^a	.46 ^a	.36 ^a	.45 ^a	.48 ^a	.49 ^a	.38 ^a	.25 ^c	-.79 ^a	1		
% Unemployed (11)	-.35 ^b	-.33 ^b	-.24 ^c	.38 ^a	-.35 ^b	-.43 ^a	-.22 ^c	-.08	.77 ^a	-.69 ^a	1	
% Black non-Hispanic (12)	-.36 ^a	-.32 ^b	-.31 ^b	-.35 ^b	-.37 ^a	-.41 ^a	-.25 ^c	-.05	.66 ^a	-.69 ^a	.76 ^a	1

^aCorrelation is significant at <.001 level (2-tailed);

^bCorrelation is significant at the 0.01 level (2-tailed);

^cCorrelation is significant at the 0.05 level (2-tailed)

Relationship of PNES scale and subscales to individual level factors among low-income women living in and around Chicago, Illinois (n=267), and percent of between community area variance explained by community area poverty.

Table 4

Individual level predictor variables	Total PNES	Aesthetic	Physical/Walking Environment	Healthy Food	Safety	Violence	Cohesion	Activities with Neighbors
Intercept	3.30 (.22)***	3.95 (.31)***	3.68 (.23)***	2.78 (.28)***	3.25 (.36)***	3.31 (.32)***	3.41 (.31)***	2.20 (.29)***
HIV+	.13 (.08)	.13 (.12)	.09 (.09)	.02 (.11)	.35 (.14)*	.34 (.13)**	.18 (.13)	-.11 (.12)
Age >= median 47 years	.18 (.07)*	.29 (.11)**	.15 (.08)+	.13 (.10)	.11 (.13)	.25 (.11)*	.25 (.11)*	.11 (.10)
Black	-.04 (.12)	.10 (.18)	.07 (.13)	-.33 (.16)*	-.07 (.21)	-.15 (.18)	.01 (.18)	-.09 (.17)
Hispanic	-.02 (.18)	.12 (.25)	.03 (.18)	-.25 (.23)	.07 (.30)	.17 (.26)	.05 (.25)	-.35 (.24)
High school or more education	.16 (.08)+	.23 (.12)+	.12 (.08)	.12 (.11)	.23 (.14)	.28 (.12)*	.07 (.12)	.10 (.12)
Employed	.05 (.09)	.11 (.13)	.04 (.09)	-.06 (.11)	.19 (.15)	.09 (.13)	.03 (.13)	-.01 (.12)
HH income <\$12k/year	-.20 (.09)*	-.24 (.13)+	-.16 (.09)+	-.29 (.12)*	-.20 (.15)	-.13 (.14)	-.34 (.13)*	-.02 (.13)
Between community area variance	.047	.107	.115	.035	.131	.048	.035	.000
Percent of CA below FPL (10% increments)	-.19 (.04)***	-.26 (.05)***	-.20 (.04)***	-.19 (.04)***	-.27 (.06)***	-.26 (.05)***	-.12 (.05)*	.01 (.05)
Between community area variance	.026	.059	.070	.014	.111	.035	.032	.000
Percentage of between community area variance explained	44.7%	44.9%	39.1%	60%	15.3%	27.1%	8.6%	0%

Table 5

Relationship of neighborhood measures to depressive symptoms in mixed effects linear regression model. PNES measures entered in separate models adjusting for HIV status, age, race/ethnicity, education, employment and income.

PNES Measure	CESD Depressive Symptoms
Total scale	−3.24 (1.15), $p=.005$
Subscales	
Aesthetic quality	−2.01 (0.78), $p=.011$
Physical activity/Walking environment	−.288 (1.08), $p=.008$
Availability of healthy foods	−0.81 (0.898), $p=.363$
Safety	−0.94 (0.69), $p=.174$
Violence (higher is less)	−1.99 (0.80), $p=.012$
Social cohesion	−1.79 (0.79), $p=.024$
Activities with neighbors	−1.21 (0.85), $p=.154$