

September 22, 2006

## Abstract

### Neighborhood Characteristics: Objective versus Subjective Measurement

Laryssa Mykyta<sup>1</sup>  
Irma T. Elo<sup>1</sup>  
Rachel Margolis<sup>1</sup>  
Jennifer Culhane<sup>2</sup>

<sup>1</sup> Population Studies Center, University of Pennsylvania, 3718 Locust Walk, Philadelphia, PA 19104.

<sup>2</sup> Department of Obstetrics and Gynecology, Drexel University College of Medicine, 245 N 15<sup>th</sup> St., 17<sup>th</sup> Floor, Philadelphia, PA 19107.

Acknowledgements: This research is supported by grants HD36462 from the National Institute of Child Health and Human Development and TS-626 from the Centers of Disease Control and Prevention.

In recent years, there has been growing interest in how residential context affects health and social wellbeing (Brooks-Gunn, Duncan and Aber 1997; Kawachi and Berkman 2003; Sampson, Morenoff and Gannon-Rowley 2002). Studies have examined associations between neighborhood indicators and health outcomes (Morenoff 2003; Diez-Roux et al. 1997; Yen and Kaplan 1999; LeClere, Rogers and Peters 1997; Anderson et al. 1996), health behaviors (Duncan, Jones and Moon 1999; Shenassa, Leibhaber and Ezeamama 2006), educational attainment (Garner and Raudenbush 1991; Ainsworth 2002), crime and delinquency (Sampson 1985; Morenoff, Sampson, and Raudenbush 2001), and child development (Brooks-Gunn et al. 1993; Duncan and Raudenbush 1999). Despite increasing interest in neighborhood effects, relatively little research has been devoted to the development of best practices and methods to measure salient neighborhood characteristics (Raudenbush and Sampson 1999). The lack of attention to measurement issues may contribute to inconsistent findings in this literature.

In general, two types of data have been used to measure neighborhood context: objective characteristics and survey respondents' perceptions of neighborhood quality. Objective indicators are derived from census data, police department statistics, direct observation (e.g., videotaped surveillance), and other administrative or public health records (Raudenbush and Sampson 1999; Krieger et al. 2003). Subjective indicators are based on primary data collected from residents to gauge their perceptions of neighborhood safety, social interactions, and physical disorder (Sampson, Raudenbush and Earl 1997; Coulton, Korbin and Su, 1996). Few studies have explored the extent to which objective indicators (such as crime rates) are correlated with individuals' perceptions (such as neighborhood safety) with some notable exceptions. Sampson and Raudenbush (2004), for example, found that indices of objective social and physical disorder were highly significant predictors of residents' perceptions of these disorders, suggesting a relatively high correspondence between objective and subjective measures. However, they also discovered that the socioeconomic, racial and ethnic makeup of the neighborhood significantly predicted residents' perceptions of disorder, even when objective neighborhood conditions were controlled. This finding is similar to that of Quillian and Pager (2001) who documented that the racial composition of the neighborhood was associated with residents' perceptions of crime independent of actual crime rates. Specifically, there was a

significant positive association between the percentage of young black men in the neighborhood and perceived levels of crime. This association held after adjustment for actual police-recorded crime rates, survey-reported victimization, and measures of neighborhood deterioration. The actual crime rates also remained significant predictors of perceptions. In both papers, in addition to observed neighborhood characteristics, individual attributes were also significant predictors of perceptions.

In this paper, we investigate the association between objective and subjective measures of neighborhood conditions in three domains: crime and safety, physical disorder and social disorder. Specifically, we address the following questions:

- (1) Do objective indicators of neighborhood conditions predict individual perceptions of neighborhood quality?
- (2) Do individual-level characteristics predict perceptions of neighborhood quality and do they modify the association between objective indicators of neighborhood conditions and subjective assessment?
- (3) Do neighborhood racial composition and the socioeconomic make-up of the neighborhood predict perceptions of neighborhood quality over and above objective indicators of neighborhood conditions and individual characteristics?

The extent to which individuals' perceptions of neighborhood conditions systematically diverge from corresponding objective characteristics raises questions about the validity of using respondents' perceptions to study the effects of neighborhood context on health and other outcomes of interest. Depending on the research question, objective or perceived measures may be more strongly associated with the outcome of interest. Thus, using one measure as opposed to the other may cause researchers to overstate or understate neighborhood effects.

### *Data and Methods*

We use data from a study designed to investigate racial/ethnic differences in pregnancy outcomes among low-income inner-city women with a focus on the role of maternal stress and neighborhood context. Between February 1999 and September 2004 English and Spanish

speaking pregnant women seeking care from public health centers in Philadelphia were recruited to the study. Trained female interviewers collected detailed information on socio-demographic characteristics, health behaviors, maternal health, psychosocial characteristics, social support and housing and neighborhood conditions (Culhane et al. 2002). Of the 5,303 eligible women, 4,879 (92%) consented to participate in the study. Of these women, 4,829 answered all questions pertaining to neighborhood perceptions and the home addresses of 4,605 (95.4%) women were successfully geocoded, permitting the identification of Philadelphia resident census tracts and block groups.

Although the study women were economically disadvantaged, they came from 317 of the 381 Philadelphia census tracts with an average of 15 women per tract (a range from 1 to 95) or from 1,320 of the 1,816 Philadelphia block groups with an average of 4 women per block group (a range from 1 to 32) (Figure 1). There are substantial differences in neighborhood conditions across these tracts and block groups, as evidenced by the range in poverty rates from 0% to 77%. Thus, there is sufficient variation in neighborhood conditions to facilitate the proposed analyses and the sample provides a unique opportunity to assess the association between objective and subjective neighborhood conditions among disadvantaged, inner-city women.

We measure perceptions of neighborhood conditions based on survey questions in our three domains drawn from the work of Coulton et al. (1996): (1) crime, (2) physical disorder, and (3) social disorder (see Table 1). The questions are highly correlated within each domain and can be combined to create summary indices of neighborhood perceptions. Cronbach's alpha was 0.876 for crime and safety, 0.856 for social disorder, and 0.896 physical disorder questions. The indices created based on these questions are used as dependent variables in the analyses.

Objective measures of the three neighborhood domains are constructed using administrative records and 2000 census data (see Table 1). To construct our objective indicator of crime and safety, we use data for the period 1998 – 2002 on Serious Incidents against Property, Serious Incidents against Persons and Narcotics Arrests to calculate crime rates at the tract and the block

group level standardized to 2000 population.<sup>1</sup> The physical order domain is based on administrative record data on vandalism, vacant buildings, and housing abandonment (cleaned and sealed properties). We use 2000 census data to construct an index of social disorder (for specific items see Table 1).

Because individuals may use different standards to rate their neighborhoods reflecting past experiences and personality and psychosocial characteristics (Quillian & Pager 2001; Sampson & Raudenbush 2004; St. John 1987), we include several individual-level socio-demographic characteristics such as age, race/ethnicity, marital status, nativity, household income, and educational attainment. In addition, we control for such psychosocial characteristics as depressive symptomology that have been shown to be associated with neighborhood perceptions in previous studies (Cutrona et al. 2000, Geis and Ross 1998).

We construct several measures of racial composition of a neighborhood to test whether they influence residents' perceptions of neighborhood quality over and above objective indicators of neighborhood conditions and whether they mediate the association between objective indicators and perceptions. These include percent non-Hispanic black and percent Hispanic, and three distinct measures of residential segregation calculated for non-Hispanic blacks and non-Hispanic whites and for Hispanics and non-Hispanic whites both at the tract and block group level: (1) the index of dissimilarity (D), (2) an exposure index (P); and (3) an isolation index (I). The index of dissimilarity measures how evenly one group (e.g. non-Hispanic blacks) are distributed across block groups within a census tract relative to another group (e.g. non-Hispanic whites) or across blocks within block groups. The exposure index provides an indicator of the extent to which members of one group have the potential to interact with members of another group, while the isolation index gives an indicator of how isolated members of one group (e.g., Hispanics) are from another group (non-Hispanic whites) (Massey & Denton 1988). We test whether these measures differ in their association with neighborhood perceptions and objective neighborhood characteristics.

---

<sup>1</sup> Serious Incidents include aggravated assault, robbery, burglary, larceny-theft, motor vehicle theft, arson, murder and forcible rape.

In addition, we introduce two additional neighborhood-level measures drawn from the 2000 census: neighborhood-level economic disadvantage, measured by neighborhood-level poverty rate, and neighborhood stability, measured by % of persons in the same house five years prior to the 2000 census.

We use random-intercept multilevel models to predict perceptions of neighborhood quality separately for each domain (Goldstein 1995). All models are estimated with STATA 9. We define neighborhoods both at the census tract and block group level to test whether our results are sensitive to how neighborhoods are defined.

## References

- Ainsworth, J. W. 2002. "Why does it take a village? The mediation of neighborhood effects on educational achievement." *Social Forces* 81(1):117-152.
- Anderson, R.T., P. Sorlie, E. Backlund, N. Johnson, and G.A. Kaplan. 1996. "Mortality Effects of Community Socioeconomic Status." *Epidemiology* 8(1):42-47.
- Brooks-Gunn, J., G. J. Duncan, and J. L. Aber. eds. 1997. *Neighborhood Poverty: Volume I: Context and Consequences for Children*. New York: Russell Sage Foundation.
- Brooks-Gunn, J., G.J. Duncan, P.K. Klebanov, and N. Sealand. 1993. "Do Neighborhoods Influence Child and Adolescent Development?" *American Journal of Sociology* 99(2):353-95.
- Coulton, C.J, J.E. Korbin, and M. Su.1996. "Measuring Neighborhood Context for Young Children in an Urban Area." *American Journal of Community Psychology* 24 (1): 5-32.
- Culhane, J.F., V. Rauh, K.F. McCollum, I.T. Elo, and V. Hogan. 2002. "Exposure to Chronic Stress and Ethnic Differences in Rates of Bacterial Vaginosis Among Pregnant Women." *American Journal of Obstetrics and Gynecology* 187(5):1272-76.
- Cutrona, C., D. Russell, R. Hessling, P. Adama Brown, and V. Murray. 2000. "Direct and Moderating Effects of Community Context on the Psychological Well-Being of African American Women." *Journal of Personal and Social Psychology* 79(6): 1088-101.
- Diez-Roux, A.V., F.J. Nieto, C. Muntaner, H.A. Tyroler, G.W. Comstock, E. Shahar, L.S. Cooper, R.L. Watson, M. Szklo. 1997. "Neighborhood Environments and Coronary Heart Disease: A Multilevel Analysis." *American Journal of Epidemiology* 146(1):48-63.
- Duncan, G.J., K. Jones, and G. Moon. 1999. "Smoking and deprivation: Are there neighborhood effects?" *Social Science and Medicine* 48:497-505.
- Duncan, G.J. and S. Raudenbush.1999. "Assessing the Effects of Context in Studies of Child and Youth Development." *Educational Psychologist* 34(1):29-41.
- Garner, C. L. and S.W. Raudenbush. 1991. "Neighborhood effects on educational attainment: A multilevel analysis." *Sociology of Education* 64(4), 251-262.
- Geis, K.J. and C.E. Ross. 1998. "A New Look at Urban Alienation: The Effect of Neighborhood Disorder on Perceived Powerlessness." *Social Psychology Quarterly* 61(3):232-246.
- Goldstein, H. 1995. *Multilevel Statistical Models*. New York: Halsted Press.
- Kawachi, I. and L.F. Berkman eds. 2003. *Neighborhoods and Health*. Oxford: Oxford University Press.
- Krieger N., J.T. Chen, P.D. Waterman, M.J. Soobader, S.V. Subramanian, and R. Carson. 2003. "Choosing area based socioeconomic measures to monitor social inequalities in low birth weight and childhood lead poisoning: The Public Health Disparities Geocoding Project (US)." *Journal of Epidemiology and Community Health* 57(3):186-99.
- LeClere, F.B., R.G. Rogers, and K.D. Peters. 1997. "Ethnicity and Mortality in the United States: Individual and Community Correlates." *Social Forces* 76(1):169-98.
- Massey, D. and N. Denton. 1988. "The Dimensions of Residential Segregation." *Social Forces* 67(2):281-315.
- Morenoff, J.D. 2003. "Neighborhood Mechanisms and the Spatial Dynamics of Birth Weight." *American Journal of Sociology* 108(5):976-1017.
- Morenoff, J.D., R. J. Sampson, and S.W. Raudenbush. 2001. "Neighborhood Inequality, Collective Efficacy, and the Spatial Dynamics of Urban Violence." *Criminology* 39(3):517-59.
- Quillian, L. and D. Pager. 2001. "Black Neighbors, Higher Crime? The Role of Racial

- Stereotypes in Evaluations of Neighborhood Crime.” *American Journal of Sociology* 107(3):717-67.
- Raudenbush, S.W. and R.J. Sampson. 1999. “Ecometrics: Toward a Science of Assessing Ecological Settings, With Application to the Systematic Social Observation of Neighborhoods.” *Sociological Methodology* 29:1-41.
- Sampson, R.J. 1985. “Neighborhood and Crime: the Structural Determinants of Personal Victimization.” *Journal of Research in Crime and Delinquency* 22(1):7-40.
- Sampson, R.J. and S.W. Raudenbush. 2004. “Seeing Disorder: Neighborhood Stigma and the Social Construction of ‘Broken Windows’.” *Social Psychology Quarterly* 67(4): 319-42.
- Sampson, R.J., Morenoff, J. and T. Gannon-Rowley. 2002. “Assessing ‘Neighborhood Effects’: Social Processes and New Directions in Research.” *Annual Review of Sociology* 28:443-478.
- Sampson, R.J., S.W. Raudenbush, and F. Earl. 1997. “Neighborhoods and Violent Crime: A Multilevel Study of Collective Efficacy.” *Science* 277(5328):918-24.
- Shenassa, E.D., A. Leibhaber, and A. Ezeamama. 2006. “Perceived Safety of Area of Residence and Exercise: A Pan-European Study.” *American Journal of Epidemiology* 163(11):1012-7.
- St John, C. 1987. “Racial Differences in Neighborhood Evaluation Standards.” *Urban Affairs Quarterly* 22(3):377-98.
- Yen, I.H. and G.A Kaplan. 1999. “Poverty Area Residence and Changes in Depression and Perceived Health Status: Evidence from the Alameda County Study.” *International Journal of Epidemiology* 28: 90-4.



**TABLE 1: Variables Used to Construct Measures of Individual Neighborhood Perceptions and Objective Neighborhood Conditions**

	<b>Individual Neighborhood Perceptions</b> <i>(Based on individual responses to the following questions)</i>	<b>Objective Neighborhood Conditions</b>
<b>Crime/Safety</b>	How often these things are a problem or are found in your neighborhood: <i>Range: 1 (Rarely) to 10 (Frequently)</i> (1) Drug Dealers How worried are you about the following things in your neighborhood: <i>Range: 1 (Not Worried) to 10 (Worried)</i> (2) Having property stolen (3) Walking alone at night (4) Letting your kids out during the day (5) Letting your kids out at night (6) Being robbed (7) Being murdered	Narcotics Arrests 1998-2002 Serious Incidents Against Persons 1998-2002 Serious Incidents Against Property 1998-2002 <i>(All crime data provided by the University of Pennsylvania Cartographic Modeling Laboratory)</i>
<b>Physical Disorder</b>	How often these things are a problem or are found in your neighborhood: <i>Range: 1 (Rarely) to 10 (Frequently)</i> (1) Trash (2) Graffiti (3) Abandoned cars (4) Vacant buildings (5) Houses and yards not kept up	Vandalism 1998-2002 Vacant Buildings 2000 Cleaned and Sealed Properties 2000 <i>(Data provided by the University of Pennsylvania Cartographic Modeling Laboratory)</i>
<b>Social Disorder</b>	How often these things are a problem or are found in your neighborhood: <i>Range: 1 (Rarely) to 10 (Frequently)</i> (1) Drunks (2) Unemployed adults (3) Youth (4) Gang activity	% of Adults Not in the Labor Force <i>(Census 2000)</i> % of Males 20-29 years of age Not in the Labor Force <i>(Census 2000)</i> % Single Mother Headed Households <i>(Census 2000)</i> % Teenage pregnancy rate <i>(Vital Statistics Data for the City of Philadelphia: Birth Records 1998-2002)</i>

FIGURE 1: Map of Study Women, Philadelphia, PA (n = 4,605)

