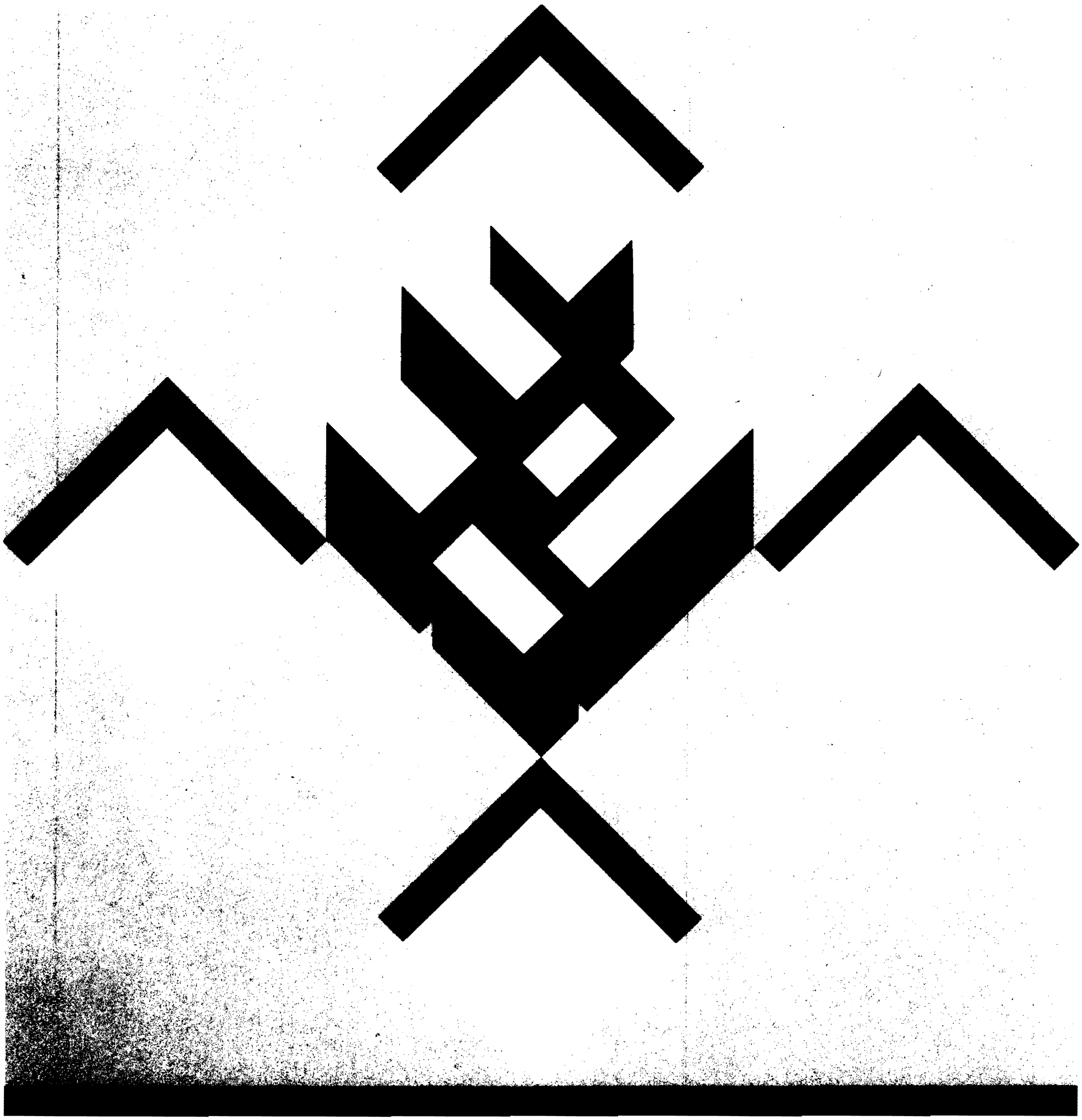
U.S. Department of Housing and Urban Development
Office of Policy Development and Research

Annual Housing
Survey Studies

No. 2

Evaluating Measures of Neighborhood Quality in the Annual Housing Survey



EVALUATING MEASURES OF NEIGHBORHOOD QUALITY IN THE ANNUAL HOUSING SURVEY

Prepared for:

U.S. Department of Housing and Urban Development
Office of Policy Development and Research

by

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March 1979

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402

Data from the Annual Housing Surveys are available in joint HUD-Census publications. The national data are published in Series H-150, comprising six reports, and the metropolitan data are published in Series H-170, with a separate report for each metropolitan area. Series H-171 is a supplementary report on the metropolitan areas. These reports are also available in microfiche form from the Library, Bureau of the Census, Washington, D.C., 20233. The published reports may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402. All the data are abailable in public use computer tapes from the Data User Services Division, Bureau of the Census, Washington, D.C., 20233.

The research forming the basis for this report was conducted pursuant to Contract HUD-2513 with the Office of Policy Development and Research, U.S. Department of Housing and Urban Development. Invaluable computational assistance was provided by Herbert Wong and Tony Shih. The statements and conclusions contained herein are those of the contractor and do not necessarily reflect the views of the sponsoring agency.

FOREWORD

This paper continues our series of Annual Housing Survey studies, reporting on research that utilizes the capabilities of the AHS for monitoring and interpreting current developments in housing, neighborhood, and household characteristics.

The Department of Housing and Urban Development has funded a national housing survey, performed by the Bureau of the Census, since 1973, with separate surveys for 60 metropolitan areas included since 1974. The survey provides current information on the size and composition of the housing inventory, characteristics of its occupants, changes in the inventory resulting from new construction and from losses, indicators of housing and neighborhood quality, and characteristics and dynamics of urban housing markets for the Nation and four census regions. Every third or fourth year, these data are also gathered for most of the 50 largest metropolitan areas and for some smaller, fast-growing metropolitan areas.

The Annual Housing Survey is designed to help policymakers and scholars understand urban dynamics and analyze local policy problems. Longitudinal linkage of the annual national file provides an unparalleled opportunity to study dynamic processes in housing markets and population shifts; the metropolitan surveys give greater detail on the housing and population characteristics of suburbs and cities in specified metropolitan areas.

Because such substantive uses can only be as valid as the data on which they are based, we continually attempt to evaluate and improve items on the Annual Housing Survey. This paper, prepared under contract with HUD's Office of Policy Development and Research by Dr. William T. Bielby of the University of California at Santa Barbara, examines the relative impact of neighborhoods, respondent characteristics, and household attributes on responses to "neighborhood quality" items in the 1976 AHS.

Items eliciting respondents' opinions of neighborhood services, neighborhood conditions and the general living environment were included in the survey because of a growing realization that neighborhood quality, as well as housing quality, is important to residential satisfaction. Yet the utility of subjective evaluations of quality has been open to question. Dr. Bielby's isolation of "neighborhood effects" demonstrates that responses to the neighborhood quality questions do indeed vary systematically by neighborhood. Respondents' evaluations of their neighborhoods thus may be presumed to reflect real variations in the quality of those neighborhoods.

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ABSTRACT

This report examines the relative impact of neighborhoods, respondent characteristics, and household attributes on responses to the "neighborhood quality" items in the 1976 Annual Housing Survey (AHS). Exploiting the clustering in the sample design of the AHS, it is possible to isolate "neighborhood effects" by modelling the similarity in responses provided by neighboring respondents. It is found that the AHS responses to the neighborhood quality items do indeed vary systematically by neighborhoods. However, evidence is also presented which suggests that non-trivial "response effects" are elicited in the reports of these items in the AHS.

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Introduction

The Annual Housing Survey (AHS) routinely obtains evaluations of neighborhoods and housing units from the household respondents. "Neighborhood quality" is an important social indicator, possibly responsive to manipulation through social policy. But the Census Bureau rarely collects "subjective" data, so little is known about the sensitivity of the neighborhood items to true differences among neighborhoods. Indeed, we do not know simply the degree to which responses to these items vary by neighborhoods and the degree to which they vary among respondents from the same neighborhood. This report utilizes the clustering of the AHS sample design in order to estimate the degree to which the reports of household respondents of neighborhood conditions, overall neighborhood rating, and overall housing rating are systematically related to neighborhood differences.

Each household respondent to the Annual Housing Survey reports on twelve neighborhood conditions, on the adequacy of six neighborhood services, and on his or her overall evaluation of the quality of the neighborhood. But variation among individuals in their responses to these items is not necessarily exclusively a function of the neighborhoods in which they live. Characteristics that vary by households within neighborhoods may be causally or functionally related to respondents' reports of neighborhood characteristics. For example, neighborhoods are not perfectly homogeneous in their socioeconomic composition. In a given neighborhood, those who are most advantaged may experience "status discrepancy" where their social status exceeds the status of their neighborhood. They may evaluate neighborhood conditions less favorably than disadvantaged neighbors who experience the opposite discrepancy. Alternatively, the socioeconomically disadvantaged may be less geographically mobile, more dependent upon locally provided goods and services, and consequently more sensitive to neighborhood shortcomings. In either case, variation among individuals in responses to the neighborhood items will confound systematic variation between neighborhoods with that occurring across households within neighborhoods. Similar consequences follow if, within neighborhoods, reports of neighborhood characteristics are affected by attributes of the housing unit such as the structural condition of the unit or monthly housing costs. Finally, reports of neighborhood characteristics may vary across individuals because of response errors. That is, part of the "within-neighborhood" variation may also be "within-individual"; on two separate occasions the same person may give different reports of a stable neighborhood characteristic.

In order to intelligently interpret statistical analyses of AHS measures of neighborhood characteristics, it is important to know the degree to which the responses do indeed reflect characteristics of neighborhoods as opposed to the other sources of variation such as those described above. The analysis reported here will exploit the clustering in the sampling design of the AHS in order to separate the analysis of determinants of neighborhood quality into between-neighborhood and within-neighborhood components.

Sample and Data

Fortunately, the sample design of the AHS provides a unique opportunity to assess components of variation on reports of neighborhood quality. Since the sample is composed of clusters of neighboring households, the covariation of reports of neighborhood quality among pairs of neighboring households can be decomposed into neighborhood, household, and residual sources of variation. Details of the sample design of the AHS can be found in U. S. Department of Commerce (1978). The statistical model is directly analagous to the econometric model used to analyze "family background" effects on socioeconomic achievement through a decomposition of covariation among attributes of siblings (Taubman, 1977; Jencks, et al., 1972). Conceptually, neighboring households replace families.

The data analysis file was constructed as follows. First, the 69,992 household records of the 1976 AHS were sorted according to neighborhood clusters. The clusters ranged in size from one to eighteen housing units, although most (98 percent of the nonrural clusters) were of size one, two, three, or four. Within each cluster, a pair of non-vacant adjacent units (units with consecutive serial numbers) was selected randomly. The pair of households was randomly ordered, and sampling weights were adjusted for the size of the cluster from which the pair was selected. Rural pairs were excluded from the analysis. The specific variables used in the analysis are described in Table 1.

The Neighborhood Unit

"Neighborhood" in this analysis is defined operationally. It is that which AHS respondents in adjacent household units are referring to in common when confronted with the survey items about "neighborhood." The context provided by the survey items is contained in item 102a:

> "The following questions are concerned with different aspects of your PRESENT neighborhood. Here is a list of conditions which many people have on their streets. Which, if any, do you have?"

No further context is provided in item 103 on neighborhood. Item 104a elicits an overall rating as follows:

> "In view of all the things we have talked about, how would you rate this NEIGHBORHOOD as a place to live - would you say that it is excellent, good, fair, or poor?"

Thus, the survey items were apparently designed to have the street on which a person lives as the referent. But, of course, that does not guarantee that all or even most respondents reported characteristics of their "street" as a neighborhood. Respondents might have a different areal, social, political, or administrative unit in mind. Furthermore, the most appropriate definition of neighborhood for analysis and policy purposes may depend upon the substantive use to which the data are applied. Under any definition there is likely to be substantial slippage between the

TABLE 1

Variable		Mean	S.D.
ED[1]	Education of household head (years)	11.99	3.52
INC[1]	Family income ($1,000)	14.692	10.969
RACE[1]	Race (1 = black, 0 = nonblack)	.107	.309
TNRE	Tenure (1 = renter, 0 = nonrenter)	.360	.482
STRPR[2]	Structural problems (sum of eight dichotomous items: water breakdown, sewer breakdown, blown fuses, leaky roofs, holes in floor, broken plaster, peeling paint, cracked walls; 1 = present, 0 = absent)	.358	.771
COSTHS[3]	Monthly cost of housing in $100's	2.080	1.456
NQ[4]	Neighborhood quality scale (sum of twelve items: street noise, street traffic, streets need repair, streets impassable, inadequate street lighting, neighborhood crime, trash and litter, abandoned structures, rundown houses, industrial activities, odors or smoke, airplane noise; each item scored 4 = not present, 3 = present, 1 = present and bothersome, 0 = present and wish to move)	42.45	5.75
NR[4]	Overall neighborhood rating (4 = excellent, 3 = good, 2 = fair, 1 = poor)	3.125	.766
HR[4]	Overall housing rating (same as NR)	3.145	.760
RATS[2]	Signs of rats or mice in unit (1 = yes, 0 = no)	.084	.277
AGE STR	Age of structure (years)	25.05	15.90
# PERS[1]	Number of persons in household	2.88	1.65
NSERV[2]	Neighborhood service scale (sum of six dichotomous items: public transportation, schools, shopping, police, fire, clinics; 1 = inadequate, 0 = adequate)	.912	1.82
HDEMPL[2]	Head employed last week (1 = yes, 0 = no)	.697	.460

[1]Missing data were allocated by Census Bureau.

[2]Missing data on highly skewed items were assigned the modal category.

[3]If neither monthly housing cost nor gross rent was available, missing data were assigned from a regression prediction based upon ED, INC, RACE, TNRE and STRPR. A random normal residual with variance equal to the regression standard error of estimate was added to the predicted value.

[4]All cases with missing data were excluded from analysis.

conceptualization of neighborhood by the designers of the survey, the context provided by the survey item as a stimulus, and the actual referent for the respondents' reports.

The shortcomings of the operational definition of neighborhood required for this analysis (indeed, for any analysis using the AHS) should be recognized in interpreting the results for the models presented below. Any sizable "neighborhood effects" that we detect with such a narrow operational definition of neighborhood would suggest a promising potential for new research utilizing survey items containing a more clearly conceptualized notion of neighborhood.

Model

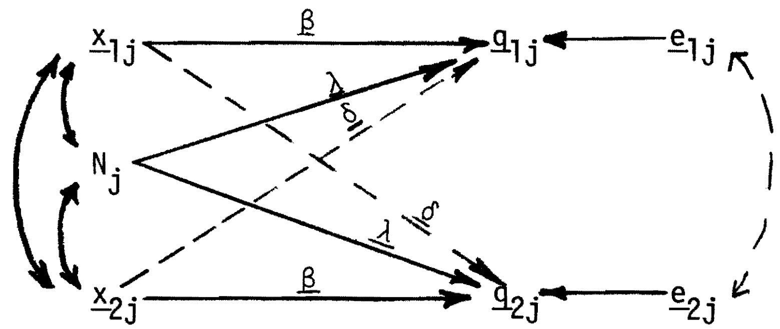
Let $\underline{q}_{ij}$ be a vector of L neighborhood characteristics reported by the i'th individual in neighborhood j. Vector $\underline{x}_{ij}$ consists of M measurable determinants of $\underline{q}_{ij}$. The $\underline{x}_{ij}$ and $\underline{q}_{ij}$ vary both between and within neighborhoods. N_j is an unobservable variable that represents the effect on $\underline{q}_{ij}$ of being in the j'th neighborhood; it is the "neighborhood effect." Vector $\underline{e}_{ij}$ represents unmeasured within-neighborhood determinants of $\underline{q}_{ij}$, including errors of measurement.

The model for two observations per neighborhood, presented schematically in Figure 1, can be specified as follows:

$$(1)\quad \underline{q}_{1j} = \underline{\beta}'\underline{x}_{1j} + \underline{\lambda}'N_j + \underline{\delta}'\underline{x}_{2j} + \underline{e}_{1j},$$

$$(2)\quad \underline{q}_{2j} = \underline{\beta}'\underline{x}_{2j} + \underline{\lambda}'N_j + \underline{\delta}'\underline{x}_{1j} + \underline{e}_{2j}$$

The metric for the unobservable N_j is established by the normalization, $E(N_j) = 0$ and $E(N_j^2) = 1$. The disturbance specification assumes that $\underline{e}_{1j}$



(1) $\underline{q}_{1j} = \underline{\beta}'\underline{x}_{1j} + \underline{\lambda}'N_j + \underline{\delta}'\underline{x}_{2j} + \underline{e}_{1j}$

(2) $\underline{q}_{2j} = \underline{\beta}'\underline{x}_{2j} + \underline{\lambda}'N_j + \underline{\delta}'\underline{x}_{1j} + \underline{e}_{2j}$

Figure 1

A Model for Reports of Neighborhood Quality and $\underline{e}_{2j}$ have zero mean and are each uncorrelated with $\underline{x}_{1j}$, $\underline{x}_{2j}$, and N_j. Further, $E(\underline{e}_{1j}\underline{e}_{1j}')$ and $E(\underline{e}_{2j}\underline{e}_{2j}')$ are identical full symmetric matrices. That is, the model assumes that the within-household covariation among reports of different neighborhood characteristics is not completely accounted for by the exogenous variables. Finally, the model allows for disturbances of the same neighborhood characteristics to be correlated across households in the same neighborhood. That is, $E(\underline{e}_{1j}\underline{e}_{2j}')$ is a diagonal matrix.

The L x M matrices $\underline{\beta}'$ and $\underline{\delta}'$ and the L x 1 vector $\underline{\lambda}'$ comprise the structural coefficients of the model. The complete symmetry in coefficients imposed across equations is a consequence of the random ordering of paired units within households. Elements of $\underline{\beta}'$ represent the within-neighborhood effects of the M measured household attributes on the L reports of neighborhood characteristics, and elements of $\underline{\delta}'$ represent the within-neighborhood effects of neighbor's household attributes. Elements of $\underline{\lambda}'$ represent the differential effects of neighborhood on the L reports of neighborhood characteristics.

The model is not identified (structural coefficients cannot be computed from observable variances and covariances) unless restrictions are imposed on $\underline{\delta}'$. Because the analysis is essentially exploratory, I could derive no a priori restrictions. Instead, I first estimated a model where $\underline{\delta}' = 0$. Then, following the suggestion of Sörbom (1975) and Jöreskog and Sörbom (1978), I added parameters to $\underline{\delta}'$ based on examination of covariance residuals and the magnitude of first-order derivatives of the log-likelihood function with respect to the fixed elements of $\underline{\delta}'$.

To summarize the model in non-technical terms, I have specified a linear model of the determinants of AHS reports of neighborhood characteristics.

The model allows for determinants measured at the level of the individual household unit (socioeconomic position, cost and structural condition of housing) and for unmeasured effects of neighborhoods. I am able to control for the neighborhood effect because the sampling design allows computation of correlations between the reports of respondents in neighboring households. Covariation in the outcome measures (neighborhood characteristics) among neighbors not attributable to covariation in the measured household level determinants can be attributed to the effects of neighborhoods.

Between-Neighborhood Variation

The correlation of respondent's report and neighbor's report on any variable is equal to the correlation ratio--the proportion of variance occurring between neighborhoods.[1] The proportion of variance between neighborhoods for selected variables is reported in Table 2. Keeping in mind the qualification that the correlations measure similarity of randomly selected adjacent units, one can make several observations about "neighborhoods."

First, neighborhoods can be clearly characterized by older versus newer structures, as black or nonblack, and as rental or nonrental. Sixty to eighty-four percent of the variance occurs between neighborhoods for these variables. To a lesser extent, neighborhoods can be characterized by the cost of housing and family income of the residents; about a third of the variation (34 and 35 percent, respectively) occurs between neighborhoods.

Over thirty percent of the variance occurs between neighborhoods for the two AHS measures of neighborhood characteristics, the overall neighborhood rating (NR), and the neighborhood quality scale (NQ). This is about the same

TABLE 2

Proportion of Variance Between Neighborhoods
(Bivariate Correlations Between Respondent and Neighbor)
(N = 13909 pairs)

AGE STR	.837
RACE	.736
TNRE	.600
COSTHS	.338
INC	.351
NR	.344
ED	.332
NQ	.311
HR	.270
# PERS	.253
STRPR	.194
RATS	.186
HDEMPL	.159
NSERV	.111

as the degree to which variation in education of the household head occurs between neighborhoods.

Not suprisingly, somewhat less variation occurs between neighborhoods for reports of the overall rating of the household unit (HR). Just over a fourth of the variation occurs between neighborhoods for both the housing rating and number of persons in the household.

Perhaps more suprising is that there is substantial variation within neighborhoods in reports of structural problems, signs of rats or mice, unemployment of the household head, and reports of the adequacy of neighborhood services. To the extent that these last items index social problems to be addressed by policy, it would seem that programs should not be directed at the neighborhood level.

A final qualification: random measurement error ("within-household" variability in reports) attenuates the correlations in Table 2, and some items are more subject to reporting errors than others. The reliability coefficients of family income and housing costs are probably on the order of 0.8 , which would imply that about 44 percent of the "true" variation in income and perhaps 54 percent of the actual variation in housing costs lies between neighborhoods. The neighborhood and housing reports, NR, NQ, HR have reinterview reliabilities of about .7, so that perhaps as much as 45 percent of the "true" variation in these items occurs between neighborhoods. While the models to be discussed below do not explicitly incorporate response errors, the AHS reinterview data provide the necessary information on housing and neighborhood variables, and reinterview data from the Current Population Survey could provide the information for the socioeconomic variables.[2] Thus, future work could easily incorporate response errors into models of neighborhood effects on AHS reports of neighborhood characteristics (see Bielby, Hauser, and Featherman, 1977).

Estimates for Models of the Determinants of AHS Reports of Neighborhood Conditions

Table 3 presents the intercorrelations among the six endogenous (outcome) neighborhood and housing measures, three measures each for respondent and neighbor. Estimates from four different models of the determinants of the neighborhood quality scale (NQ), the neighborhood rating (NR), and the housing rating (HR), are presented in Table 4. Because of the large sample size, even small effects are statistically significant; but standardized coefficients less than .05 in magnitude can be considered substantively trivial. The first two models are simple regression models with no controls for the effects of neighborhoods. Model 1 predicts NQ, NR, and HR from head's education (ED), family income (INC), and respondent's race (RACE). Model 2 adds housing tenure (TNRE), the structural problems index (STRPR), and the monthly housing cost (COSTHS), and the same six variables for the respondent's neighbor. Model 1 seems to show that the NQ scale is independent of socioeconomic status of the household, while there appears to be a modest net tendency for respondents from high income households and white respondents to report higher overall ratings of their neighborhoods (NR) and housing units (HR). However, these results cannot be taken at face value. We cannot tell, for example, if blacks are less satisfied with their neighborhoods because they are located in less desirable neighborhoods, or if blacks are less satisfied than whites when they live in the same neighborhood, or both. Or blacks may be less satisfied with their generally poorer neighborhoods, but more satisfied than whites when they live together in the same neighborhood. The observed result could be consistent with each of these situations. Similarly, are high income respondents more pleased

TABLE 3

Correlations Among Neighborhood Quality Scale, Neighborhood Rating, and Household Rating[1]

	1 NQ	2 NQ2	3 NR	4 NR2	5 HR	6 HR2
1. NQ	--					
2. NQ2	.31	--				
3. NR	.43	.21	--			
4. NR2	.23	.46	.34	--		
5. HR	.28	.17	.60	.26	--	
6. HR2	.15	.26	.26	.58	.27	--

1 NQ, NR, and HR are reports of respondent, and NQ2, NR2, and HR2 are reports of respondent's neighbor. N = 13,909 pairs

TABLE 4

Standardized Structural Coefficients for Four Models of the Determinants of AHS Reports of Neighborhood Conditions

(N = 13909)

MODEL	DEP VAR	ED 1	INC 2	RACE 3	TNRE 4	STRPR 5	COSTHS 6	ED2 7	INC2 8	RACE2 9	TNRE2 10	STRPR2 11	COSTHS2 12	N_j 13	R^2
1	NQ	$.000^{ns}$	.070	-.074	--	--	--	--	--	--	--	--	--	--	.012
2	NQ	-.027	.022	$.011^{ns}$	$.012^{ns}$	-.219	$.004^{ns}$	.060	.040	-.066	-.062	-.055	$.011^{ns}$	--	.084
3	NQ	-.084	-.040	.076	--	--	--	--	-.022	--	--	--	--	.448	.147
4*	NQ	-.080	-.016	.059	.058	-.155	$-.005^{ns}$	--	--	--	--	--	--	.410	.173
1	NR	.088	.174	-.165	--	--	--	--	--	--	--	--	--	--	.089
2	NR	.053	.063	-.050	-.092	-.111	.038	.082	.071	-.091	-.095	-.054	$.014^{ns}$	--	.168
3	NR	-.036	$.013^{ns}$	.057	--	--	--	--	--	--	--	--	--	.622	.353
4*	NR	-.033	$.004^{ns}$	.045	$-.021^{ns}$	-.034	.035	--	--	-.021	--	.039	--	.604	.390
1	HR	.069	.200	-.154	--	--	--	--	--	--	--	--	--	--	.091
2	HR	.053	.070	-.070	-.198	-.213	.046	.040	.053	-.038	-.038	-.049	.032	--	.218
3	HR	-.016	.093	-.003	--	--	--	--	.035	--	--	--	--	.393	.201
4*	HR	.011	-.020	-.020	-.163	-.187	.036	.010	.014	$.003^{ns}$	--	$-.001^{ns}$	.023	.276	.258

ns = Coefficient less than twice its estimated standard error.

*Model 4 - chi-square goodness-of-fit is 144.95 with 95 degrees of freedom (p = .0004).

because they have been able to afford better neighborhoods and houses, or is it because they tend to be more satisfied with any given level of neighborhood and housing quality? Indeed, it may be that high income families can affort to move into better neighborhoods, but that within neighborhoods they experience a "status discrepancy" (their income status exceeds their neighborhood status), and consequently they are less satisfied. The point is that the simple regression at the household unit level of analysis necessarily confounds the within-neighborhood and between-neighborhood processes.

Like Model 1, Model 2 contains no neighborhood variable, but it adds attributes of the housing unit--tenure, structural problems, and cost--as well as the same set of variables for the neighbor. Model 2 seems to show that structural problems (STRPR) and rental status (TNRE) have modest negative effects upon the overall housing rating (HR) and, not surprisingly, smaller similar effects on the neighborhood rating (NR). Structural problems with the housing seem to have a modest negative contribution to the neighborhood quality scale (NQ), and having a renting neighbor, a black neighbor, or a neighbor with structural housing problems each appears to contribute negatively to the overall neighborhood rating and the neighborhood quality scale. But once again, we cannot accept the results at face value because the neighborhood component has been ignored. Individuals with structural housing problems, who have renting neighbors, black neighbors, or neighbors with structural housing problems are probably more likely to live in poorer neighborhoods. There is no way to know from Model 2 the degree to which the structural condition of the respondent's housing and the attributes of his or her neighbors are acting as "proxies" for the quality of the neighborhood.

Model 3 is the first of our models to incorporate "neighborhood effects." The predictors are the socioeconomic variables--education, income, and race of respondent and (where significant) neighbor--and the neighborhood component, N. While the estimation procedure required computation of a pair of equations for each outcome variable, one for the respondent and one for the neighbor, only the results for the respondent are reported, because the model is fully symmetric.

Whereas Model 1 suggested no systematic variation in the neighborhood quality scale (NQ), model 3 shows a substantial effect (.448) of neighborhoods (N_j) on NQ. Indeed, the direct effect of neighborhood directly accounts for about 20 percent of the variance in NQ ($.448^2$), which exceeds the value of R^2 because of the negative joint association or "suppressor" relationships involving N_j and the socioeconomic variables. Model 3 also shows that controlling neighborhood, blacks report a higher NQ score and highly educated persons report a lower score on the neighborhood quality scale. Thus, blacks who are able to locate in racially mixed neighborhoods provide more favorable evaluations of the conditions of those neighborhoods than do whites of similar educational and income status. Notice that this relationship was obscured in the individual household level regression of Model 1, where the between-group relationship (blacks are more likely to be in low quality neighborhoods) apparently dominated the within-group relationship.

Model 3 shows an even stronger neighborhood effect (.622) on the overall neighborhood rating (NR), and again we find that within neighborhoods, blacks give higher ratings. The overall housing rating (HR) is less responsive to neighborhood differences than are the two neighborhood variables, NQ and NR. Model 3 seems to show that within neighborhoods, respondents in high income families rate their housing more favorably. But Model 4 will show that the effect disappears when characteristics of the housing unit are introduced (i.e., income acts as a "proxy" for type and condition of housing).

Our final model, Model 4, incorporates the three socioeconomic variables (ED, INC, RACE), the three attributes of housing units, rental status (TNRE), structural problems (STRPR), and monthly housing costs (COSTHS). Many of the results are similar to those of Model 3, although there are several coefficients that were changed substantially by introducing the three (six, including neighbor's variables) housing attributes. As in Model 3, there are no effects of neighbor's attributes on respondent's report of NQ, NR, or HR that are large enough to be substantively interesting. This suggests that the effects of attributes of the neighbor detected in Model 2--with no neighborhood component--were largely spurious; that is, neighbor's attributes were functioning as "proxies" for neighborhood effects.

The effects of neighborhoods, N_j, on the two neighborhood outcomes, NQ and NR, are changed very little by introducing the three housing attributes. But the effect of neighborhoods on overall rating of the housing unit (HR) is reduced by nearly a third when the housing attributes are introduced (from .393 to .276). Within neighborhoods, there is a modest tendency for respondents in units with structural problems to report lower housing ratings (-.187). There is a slightly smaller effect of rental status (-.163), suggesting that renters rate their housing less highly than do others in their neighborhood of similar socioeconomic status who are spending the same amount for housing with similar structural attributes. The overall housing rating (HR) is, as expected, less sensitive to neighborhood effects than are the two neighborhood outcomes (NQ, NR). The housing rating is perhaps equally responsive to variation in housing attributes within neighborhoods and differences between neighborhoods. (The direct and joint contributions of TNRE, STPR, and COSTHS account for about seven percent of the variance in HR while the neighborhood component directly accounts for just under eight percent, and most of the remaining explained variance in HR can be attributed to the association of neighborhoods with housing characteristics.)

In Model 4, after controlling socioeconomic status (ED, INC, RACE), rental status (TNRE), and structural problems (STRPR), the cost of housing (COSTHS) has virtually no effect on any of the three outcome variables. None of the three housing attributes has a large effect on the overall housing rating (HR), but structural condition of the housing has a modest negative effect (-.155) on the neighborhood quality scale. This effect could be in part due to a spurious association. There could be objective structural deteriation that varies within neighborhoods that influences both the conditions assessed in the NQ scale and the assessments of structural problems of the housing unit.

Although the effects are small, Model 4 shows that within neighborhoods, blacks rate their neighborhoods more highly (on both NQ and NR) than do similarly situated whites.

Table 5 provides some additional results from our final model, Model 4. The top panel reports correlations among disturbances. The model allowed for correlations among disturbances on the reports of the three outcomes within households, and the modest correlations in the upper left and lower

TABLE 5

Disturbance Correlations, Neighborhood Component Correlations and Factor Score Regressions for Model 4.

Model 4: Correlations Among Disturbances

		1	2	3	4	5	6
1.	e_{NQ}	---					
2.	e_{NR}	.30	---				
3.	e_{HR}	.12	.46	---			
4.	e_{NQ2}	.20	---	---	---		
5.	e_{NR2}	---	.02^{ns}	---	.30	---	
6.	e_{HR2}	---	---	.08	.12	.46	---

Model 4: Zero-order Correlations of N_j with:

ED	INC	RACE	TNRE	STRPR	COSTHS	NQ	NR	HR
.33	.38	-.37	-.37	-.25	-.25	.37	.60	.44

Model 4: Factor Score Regression. Standardized Coefficients Predicting N_j from Measured Variables

	Independent Variables[1]									
Dependent Variable	ED	INC	RACE	TNRE	STRPR	COSTHS	NQ	NR	HR	R^2
N_j	.10	.06	-.09	-.08	-.07	.00	.07	.30	-.01	.68

---

[1] N_j is predicted from measured characteristics of respondent <u>and</u> neighbor. There are actually eighteen coefficients, but the coefficients on neighbor's characteristics are identical to corresponding coefficients for respondent.

right portions of the matrix show that the exogenous variables do not completely account for the endogenous covariations within households. This is not surprising; indeed we might consider Model 4 to be the reduced form of a model that allows for structural relationships among NQ, NR, and HR. One might suspect that the reports of neighborhood conditions that comprise the NQ scale causally influence the overall neighborhood rating (NR), thus accounting for the correlation of .30 between the disturbances of NQ and NR (and, by construction, the disturbances of NQ2 and NR2). The large correlation of .46 between the disturbances in the two overall ratings, NR and HR, are more disturbing, since they could suggest a "response set" contamination across the two single-item variables that comprise adjacent items on the AHS questionaire. Indeed, this is also suggested in the findings of our remeasurement model.

Any correlation of disturbances across neighboring households is even more disturbing. Since the subjective reports of household respondents are obtained independently of one another, residual similarity in their responses that can be attributed to neither their common neighborhood nor the similarity in their within-neighborhood determinants could be due to the contaminating effect of the interviewer. This is precisely what is suggested by the relatively large correlation of .20 between the disturbances of NQ and NQ2. The twelve items on neighborhood conditions that comprise the NQ scale are rather complicated and probably difficult to administer ("does the condition exist?;" "does the condition bother you?;" "is it so objectionable that you would like to move from the neighborhood?"). It is possible that different interviewers tend to elicit different "response sets" on these items, and that this accounts for the correlation of disturbances across household pairs. The issue certainly deserves serious attention in any elaboration of the models presented in this report.

Model 4 controls for neighborhoods with a single unobservable variable. How might we use the information in Model 4 to empirically scale neighborhoods along a single hierarchical dimension? The middle panel of Table 5 reports the zero-order correlations of the N_j with the observable variables in the model. The overall nieghborhood rating (NR) is the single variable most closely associated with N_j; they share 36 percent ($.60^2$) of their variance in common. The neighborhood component, N_j, is modestly related to all of the other measured variables. Surprisingly the scale of neighborhood conditions (NQ) is less correlated with N_j than is the overall housing rating (HR). The NQ scale is about as closely associated with N_j as are the socio-economic variables and the tenure variable.

The bottom panel of Table 4 presents standardized regression coefficients for a multivariate prediction equation of N_j on the six measured characteristics of respondent and six measured characteristics of the respondent's neighbor. The equation can account for 68 percent of the variance in N_j, which suggests--conditional on the validity of Model 4--that one could construct a viable neighborhood scale. The overall neighborhood rating clearly dominates the prediction equation, while education, income, race, tenure, structural problems, and the neighborhood quality scale make roughly equally small contributions to the equation. The overall housing rating, although it has a modest zero-order correlation with N_j, apparently captures information redundant with that provided by the other dependent variables, since it has virtually no predictive power.

A Comparison of Within-Neighborhood and Between-Neighborhood Processes

If differences between neighborhood pairs are modelled by subtracting equation (2) from equation (1), then we obtain:

$$(3) \quad (\underline{q}_{1j} - \underline{q}_{2j}) = (\underline{\beta}' - \underline{\delta}')(\underline{x}_{1j} - \underline{x}_{2j}) + (\underline{e}_{1j} - \underline{e}_{2j})$$

Thus, the differencing completely eliminates the "neighborhood" component, $\underline{\lambda}'N_j$, and, if $\underline{\delta}' = 0$, simple least-squares regression will provide unbiased estimates of the within-group coefficients, $\underline{\beta}'$. Since Model 4 has shown that the elements of $\underline{\delta}'$ were quite small (the effects of neighbor's characteristics on respondent's outcome), least squares estimation of (3) should provide reasonable estimates of the within-neighborhood effects of measured variables. These estimates are reported in lines 1, 3, and 5 of Table 6, and the standardized coefficients correspond quite closely to corresponding estimates from Model 4.

If neighborhood level processes are accurately captured through neighborhood composition on the measured variables, then a parallel least-squares regression on pair averages might provide a reasonable representation of the "between-neighborhood" determinants of the three outcome variables. These results are reported in lines 2, 4, and 6 of Table 6.

The scale indexing structural problems with the housing unit (STRPR) has the most pervasive influence on the three outcome variables both within and between neighborhoods, and in each case more structural problems lead to lower evaluations. Not surprisingly, structural problems reduce respondents' overall rating of their households (HR) within neighborhoods, and neighborhoods with more structural problems with housing units reported obtain lower average housing ratings. Structural problems with the housing unit

TABLE 6

Within-Neighborhood and Between-Neighborhood Regression Coefficients
(Standardized Coefficients in Parentheses) N=13909

	DEP VAR	WITHIN or BETWEEN	1 ED	2 INC	3 RACE	4 TNRE	5 STRPR	6 COSTHS	R^2
1.	NQ	W	-.138 (-.081)	$-.005^{ns}$ (-.009)	1.22 (.041)	.809 (.051)	-1.21 (-.172)	$.064^{ns}$ (-.014)	.041
2.	NQ	B	.059 (.036)	.030 (.054)	-.980 (-.061)	-.748 (-.025)	-1.96 (-.247)	.097 (.025)	.102
3.	NR	W	-.009 (-.043)	$.000^{ns}$ (.002)	.164 (.043)	$-.024^{ns}$ (-.012)	-.071 (-.078)	.016 (.028)	.011
4.	NR	B	.030 (.136)	.010 (.137)	-.347 (-.161)	-.289 (-.201)	-.162 (-.151)	.026 (-050)	.243
5.	HR	W	$.000^{ns}$ (.002)	.002 (.030)	$-.052^{ns}$ (-.013)	-.265 (-.124)	-.173 (-.184)	$.008^{ns}$ (.013)	.055
6.	HR	B	.021 (.101)	.009 (.130)	-.233 (-.112)	-.362 (-.261)	-.263 (-.257)	.034 (.068)	.308

ns= coefficient less than twice its estimated standard error.

have a similar influence on the overall neighborhood rating (NR), but the effects are considerably weaker.

The modest relationship of structural problems with housing and the NQ scale of neighborhood conditions detected in Model 4 at the within-neighborhood level is also apparent between neighborhoods. A one-point increase in the neighborhood average on the structural problems scale can be expected to produce nearly a two-point decrease in the NQ scale. The mechanism suggested above for the within-neighborhood relationship might also apply between neighborhoods. That is, there might be a degree of objective structural deterioration that varies between neighborhoods and affects both housing and neighborhood conditions.

For both race and tenure the between-neighborhood effects on the NQ scale are of opposite sign from the within-neighborhood effects. That is, both blacks and renters tend to be located in neighborhoods that are evaluated lower on the NQ scale (controlling education, income, structural problems, and housing costs), but within neighborhoods, blacks and renters evaluate the conditions of those neighborhoods more favorably than do similarly situated whites and non-renters. In this situation and in the others where the within and between-neighborhood effects are of opposite sign (ED on both NQ and NR, RACE on NR), we are perhaps detecting "status inconsistency" effects--better neighborhoods tend to be composed of higher status households, but within neighborhoods those whose household status exceeds their neighborhood status are less favorably disposed towards their neighborhoods.

The coefficients of determination (R^2) show that more of the between-neighborhood variation is systematically related to measured variables than is the case for within-neighborhood variation. This is certainly encouraging for survey items that are intended to measure characteristics of neighborhoods. It may seem paradoxical that the largest R^2 value (.308) is for the overall household rating. But that is relative to the amount of total variation that lies between neighborhoods, which is smallest for the household rating. So 31 percent of the 27 percent of HR responses that vary between neighborhoods is systematically related to measured variables, but 24 percent of the 31 percent of the NR responses varying between neighborhoods is systematic. Thus, overall, about eight percent of the total variance in both the neighborhood and household ratings (.31 x .27 and .24 x .31) can be attributable to between-neighborhood variation in socioeconomic status of household and in the cost, rental status, and structural condition of households.

Conclusions

The neighborhood items included in the AHS are indeed sensitive to differences in neighborhoods. (But this is not true of the items assessing adequacy of neighborhood services). The within-neighborhood variation in the overall neighborhood rating appears to be virtually random, unaffected by household differences in socioeconomic or housing unit attributes. More than a third of the variation in the neighborhood rating is directly attributable to neighborhood differences. The scale of neighborhood quality constructed from the twelve items on neighborhood conditions is less sensitive to neighborhood differences, and it is modestly sensitive to structural condition of the housing unit within neighborhoods. Further research should attempt to evaluate which of the twelve component items are most sensitive to neighborhood differences.

The overall housing rating, while varying somewhat among neighborhoods, is, not surprisingly, modestly sensitive to variation in two attributes of housing units--rental status and structural problems.

We found some evidence of "status inconsistency" effects within neighborhoods--lower evaluation of the neighborhood when the respondent's household status exceeded the neighborhood status. Respondents from households with more highly educated heads, white respondents, and nonrenters provided lower evaluations on the neighborhood quality scale than did other similarly situated respondents, once the neighborhood is controlled. A similar effect of race was detected for the overall neighborhood rating.

It is likely that the processes that generated the above findings differ by race and housing tenure status. Future work should disaggregate the models by race and tenure.

While the scale constructed from the neighborhood-conditions items and the overall neighborhood rating appear to be meaningfully related to neighborhood differences, their limitations cannot be overlooked. There is evidence of an interviewer-specific response set to the scale of neighborhood conditions. The similarity in responses between neighbors is greater than would be expected on the basis of their common neighborhood and similarity on socioeconomic and housing attributes. The complexity of the items suggest that different interviewers may elicit different response patterns. The remeasurement analysis (see below) provided evidence suggesting that respondents overstate the consistency between their neighborhood and household ratings.

While we detected neighborhood-specific variation, it should be considered relative to the small degree of overall variation. Most individuals report that none of the neighborhood conditions is present, and very few report that conditions bother them. The overwhelming majority of respondents rate their neighborhoods and housing as either excellent or good. What we detected is that of the small amount of variation in responses that does exist, a significant proportion is sensitive to neighborhood differences.

While the neighborhood items appear to provide information that does reflect how people feel about their neighborhoods, we were able to discover this only by exploiting the clustering feature of the sampling design. Our analyses required knowledge of the similarity in responses in reports obtained from neighboring households. Analyses applied naively at the individual level of analysis are likely to be quite misleading, because they confound within-neighborhood and between-neighborhood processes.

There are several directions in which the "neighborhood effects" models like those reported here need to be pursued further. We have not incorporated information on response errors into our models, although doing so would be reasonably straightforward. Response error variances for each outcome variable and for the structural problems index can be estimated from the remeasurement data, and response error variances for Census Bureau measures of education and income can be obtained from Current Population Survey remeasurement data. Response errors may have significantly attenuated within-neighborhood association of variables.

Alternative specifications of the unobservable "neighborhood effect" component need to be explored. The "single factor" model employed here is one of several alternatives; at the other extreme one can postulate an unobservable "neighborhood component" for each measured variable in the model. I have pursued some preliminary models in this direction, but they are significantly more complex and computationally expensive. However, it is necessary to evaluate the robustness of the unobservable specification if the models are to be used to empirically scale the neighborhood quality via the "factor score" regression employed above. Fortunately, the "difference regression" approach used above provides estimates of the within-neighborhood processes that are independent of the particular specification of the between-neighborhood components. The difference approach is, however, particularly sensitive to the attenuating effects of random response errors.

Finally, it is imperative that subjective reports of neighborhood quality be validated against independent assessment of objective neighborhood conditions. This is particularly true should the AHS measures be used in the targeting of neighborhood revitalization policy. While there are clearly neighborhood differences in reports of neighborhood quality, it does not *necessarily* follow that the neighborhoods reported to be of poorest quality are those most in need of aid.

APPENDIX

A Brief Summary of Remeasurement Results on Response Errors

Because the AHS remeasurement data could not be matched to the full AHS file, they were not as informative as they might have been. We were only able to use variables included as part of the remeasurement program, and consequently we could not dissaggregate by race. This is important because previous research (Bielby, Hauser, and Featherman, 1977) has shown substantial differences between blacks and nonblacks in the quality of data collected by the Census Bureau. Also, it precluded disaggregating the analysis by urban and rural residence. This is important because the concept of "neighborhood" as used in the AHS may be less salient to rural residents. Finally, our inability to match precluded using sampling weights.

A simple "test-retest" confirmatory factor analysis model, similar to that used by Bielby, Hauser, and Featherman (1977), was specified for the original and reinterview reports of neighborhood services (NSERV), the neighborhood quality scale constructed from the twelve items on neighborhood conditions (NQ), the overall housing rating (HR), and the overall neighborhood rating (NR). The model allowed for correlated response errors to represent the tendency of respondents to overstate (or understate) the consistency of their answers within the original AHS interview or within the remeasurement interview. For a given pair of variables, the degree of consistency (inconsistency) was assumed to be the same in the original interview as in the remeasurement interview.

The reliabilities for the original AHS reports were estimated to be:

NSERV	.67
NQ	.69
HR	.72
NR	.74

Each is quite respectable for subjective evaluations obtained from a large-scale social survey. (They might be even larger for urban respondents only.)

The within-interview error correlations are:

	1	2	3	4
1. NSERV	--			
2. NQ	.20	--		
3. HR	.09	.09	--	
4. NR	.08	.17	.34	--

The sizable correlation between errors in HR and NR (.34) suggests a modest tendency for respondents to overstate the consistency between overall housing and neighborhood ratings. The tendency would probably be less of a problem if the two ratings were not adjacent items on the questionnaire. It is probably also the case that proximity on the questionnaire contributes to the error correlations between NSERV and NQ and between NQ and NR. However, separating the different neighborhood items on the questionnaire is probably administratively problematic.

In summary, the remeasurement analysis demonstrated that the "within-individual" stability in responses to the AHS neighborhood items are probably better than one would expect for these types of subjective measures. It also demonstrated tendencies for respondents to overstate their consistency on evaluations of their neighborhoods and housing units. These tendencies are not surprising, given the placement of items on the questionnaire and the similarity of response categories for several of the items.

FOOTNOTES

1. Consider a bivariate "neighborhood effects" model where all variables are standardized to zero mean and unit variance:

$$x_{1j} = \lambda N_j + e_{1j}$$

$$x_{2j} = \lambda N_j + e_{2j}$$

The disturbance specification is:

$$E(e_{1j}e_{2j}) = E(e_{1j}N_j) = E(e_{2j}N_j) = 0$$

Then the correlation of x_{1j} and x_{2j}, $E(x_{1j}x_{2j}) = \rho_{x_{1j}x_{2j}}$, is equal to $E(\lambda^2 N_j^2 + e_{1j}e_{2j} + \lambda N_j e_{1j} + \lambda N_j e_{2j})$. But the expectations of all but the first term are zero and $E(N_j^2) = 1$, so $\rho_{x_{1j}x_{2j}} = \lambda^2$. But λ is simply the correlation in the standardized bivariate model, so λ^2 is the squared correlation between x_{1j} and N_j -- the proportion of variance between neighborhoods.

2. As reported in the Appendix, a preliminary analysis of the AHS reinterview data provides some indication of the quality of the AHS measures. Subsequent analyses incorporating response errors into the model reported in the text changed the reported results very little.

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