Aggregation issues in neighborhood research: A comparison of several levels of census geography and resident defined neighborhoods

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Abstract

Measurement of neighborhood processes and attributes rests on a decision about the proper unit on which to make those measures. It is common for researchers to aggregate survey responses to some level of geography that is a proxy for neighborhood and to treat this aggregation as the neighborhood unit. This paper examines the effects of various levels and methods of aggregation on the properties of neighborhood measures. The data come from Annie E. Casey Foundation's Making Connections survey of over 7000 households in selected neighborhoods of ten cities. This survey, among other things, queried residents about the following neighborhood attributes using five multi-item scales: Social cohesion/trust, shared expectations for informal social control, neighborhood safety, disorder and incivility, and relations with police. Individual level scale reliability is calculated for each scale using Cronbach's alpha to determine the internal consistency among the items. The majority of the scales prove to be reliable at the individual level ($\alpha > .7$). Survey records were geocoded and the following levels of aggregation are compared: Entire Making Connections area, project defined sub-areas, census tracts, census block groups and the neighborhood named by residents. Variance components and reliability coefficients are calculated for five scales at each of these levels of aggregation. For most scales, smaller geographic units yield higher reliability coefficients. However, resident named neighborhoods also yield highly reliable aggregate measures. Finally, several strategies for constructing resident defined neighborhood units in surveys are illustrated, including analysis of the names residents give to their neighborhoods and resident drawn maps of their neighborhood boundaries.

Aggregation issues in neighborhood research: A comparison of several levels of census geography and resident defined neighborhoods

In recent years, foundations and non-government organizations have launched a number of community initiatives to improve the social, economic and physical conditions in urban neighborhoods. These initiatives have grown out of concern about the growing social and economic isolation of these neighborhoods (Jargowsky, 1997; Wilson, 1987; 1996) and of the belief that such conditions have a negative effect on children and families who live there (Leventhal & Brooks-Gunn, 2000). A fundamental goal of these community initiatives is to change the neighborhood context so that residents will benefit. Community initiatives vary markedly in the specific elements of the neighborhood that they address, but in most cases changing some aspects of the social ecology is either the ultimate outcome or a mediating factor within their theory of change. However, the lack of solid methodologies to measure the relevant neighborhood concepts has made these initiatives difficult to evaluate (Connell, Kubisch, Schorr & Weiss, 1995; Fulbright-Anderson, Kubisch & Connell, 1998). Two important methodological issues are defining the neighborhood unit and measuring various attributes of that unit with as much accuracy as possible.

In this paper, we examine the relationship between the way the neighborhood unit is defined and the range, variance components and reliability of selected measures of neighborhood conditions. The data come from a baseline survey of residents in the Annie E. Casey Foundation's Making Connections sites. Strengthening neighborhoods is an important element of Making Connections' strategy for improving outcomes for families and children (www.aecf.org/initiatives/mc/). But if the neighborhood measures are not

made on the relevant social units or are unreliable, it will be difficult to determine whether Making Connections is making progress on this front.

Background

Much of the existing research on neighborhood effects on families and children has represented the neighborhood with a limited set of population characteristics from the decennial census. In most of these studies, the census tract or zip code has served as a proxy for neighborhood. (For a review of these studies, see Ellen & Turner, 1997). However, community initiatives often aim to change institutional arrangements, social processes, economic opportunities and physical conditions, not primarily the composition of the neighborhood's population. Moreover, community initiatives work with residents and local organizations whose neighborhood perceptions, activities and networks do not necessarily comport with census boundaries. Researchers studying these initiatives need to draw upon measures of a wide range of concepts and to apply such measures to varying definitions of neighborhood units.

That the specification of the neighborhood unit can affect research findings is in part due to what has been termed the "modifiable areal unit problem" (Haywood, 1998). If the size or number of geographic units is changed, the relationships among variables measured on the areal units may also change. Moreover, the specific locations of the boundaries can also affect the measures and their relationships because the particular housing units or individuals included within the aggregate unit will be changed. The modifiable areal unit problem has received substantial attention from geographers, especially with respect to the calculation of rates and the analysis of the ecological correlations among rates (Anselin, 1988). Ecological correlations and the variances

within and between units will indeed vary when the size and location of areal units are changed. Although community studies typically draw upon theories that conceive of the neighborhood as a place that bounds certain social or economic processes, in practice the units used for research are often arbitrary. Conclusions regarding neighborhood change or neighborhood effects are likely to be biased by this discrepancy between theory and operationalization. Moreover, the findings may be unreliable due to the fact that modification of the areal unit may yield different results.

A limiting factor for researcher who study neighborhoods is the dearth of well validated measures that capture important properties of the place or the collective. The term "ecometrics" has been coined by Raudenbush and Sampson (1999) to convey the need to advance the science of community measurement. The term reflects the fact that measurement of an ecological or social unit cannot rely solely on the tools of psychometrics. They argue that neighborhood concepts are mis-specified when they are derived from simple percentages or averages of an arbitrary collection of individuals. Careful attention needs to be paid to the accuracy of measurement of the neighborhood as a unit and the degree to which the measures actually reflect the concepts of interest. Yet a challenge for research on community initiatives is that both the neighborhood unit and the aspects of community that are expected to change may be ambiguous.

One approach to measuring qualities or aspects of the neighborhood is to rely on survey data collected from households sampled from within designated boundaries assumed to constitute a neighborhood. In this sense, residents serve as observers or informants, self-reporting on their perceptions of conditions, events, relationships, behaviors, and so forth. However, if the scores of the individuals in the neighborhood

sample are combined to represent an attribute of the neighborhood, the reliability of the individual measure is a necessary but not sufficient condition for a reliable measure of the aggregate. In other words, it cannot be assumed that a concept that is well measured on individuals can be summed or averaged to capture that aspect of community (Sampson, Raudenbush, and Earls, 1997; Coulton, Korbin and Su, 1996). Such aggregate measures need to be assessed for their reliability as measures of neighborhood properties (O'Brien, 1990; 1998; Raudenbush & Sampson, 1999).

Generally, the aggregate measures are more reliable if there is greater consensus among residents within neighborhoods; greater differences between neighborhoods; and larger samples of respondents within those neighborhoods. When aggregate measures yield poor reliability, this may be a sign that that there is really more than one neighborhood being represented in the sample, or that the items are ambiguous enough that they mean different things to different people. For example, Coulton, Korbin & Su (1996) queried random samples of residents within 20 block groups on 10 dimensions of their neighborhood as a social environment for raising children. The residents' scores on these ten dimensions were averaged to serve as a measure of the neighborhood context. Generalizability coefficients confirmed the aggregate reliability of many of these scales when 20 respondents per block group were used as informants. Several scales though, showed poor aggregate reliability, even though they were based on scales that displayed good internal consistency reliability (i.e. Cronbach's alpha) at the individual level.

Another key issue in accurate neighborhood measurement is the definition of neighborhood units to be used for analysis (Sampson, Morenoff & Gannon-Rowley. 2002). Specifying these units is complicated by the fact that neighborhoods are localized

communities with geographic, psychological and social meaning and referents for their residents (Chaskin, 1997). However, community initiatives are often targeted to areas whose boundaries have been defined according to government or non-profit agencies, such as planning jurisdictions or service areas. Even when numerous stakeholders contribute to the choice of the target area, the boundaries do not necessarily comport with the neighborhood as experienced by residents. Typically, these target areas actually include many neighborhoods so that if measures are naively made on the entire target area they may not reflect the neighborhood reality experienced by any of residents. A spatial analysis of maps drawn by residents of their neighborhoods found that residents' perceived neighborhoods were much smaller than planning areas or census tracts (Coulton, Korbin, Chan & Su, 2001). While the typical resident's map was approximately equal in square miles to the average block group, even residents on the same block often disagreed on the location of their neighborhood boundaries. These discrepancies suggest that the spatial definition of neighborhood is probably an elastic concept for most individuals. Given this ambiguity, symbolic referents, such as names and landmarks, may be an alternative to geography as a method of determining residents' perceptions of their neighborhoods.

Methodology

The purpose of this analysis was to explore whether the reliability of neighborhood measures derived from a household survey would differ depending on how the neighborhood unit was defined. The study compares neighborhood units that are defined at various scales of geography and units based on a symbolic definition of neighborhood, specifically neighborhood names.

Sample

The data come from a household survey conducted by the National Opinion Research Corporation (NORC) in Making Connections (MC) sites in ten cities (Denver, Des Moines, Hartford, Indianapolis, Louisville, Milwaukee, Oakland, Providence, San Antonio and Seattle). Households were randomly selected for the survey from the MC site in each city that had been defined for the Making Connections project. The interviews were conducted in English, Spanish and additional languages that were prevalent in the particular site. The interview was conducted in-person in the residents' home. In these ten sites a total 7496 households were interviewed. The average sample was approximately 750 (697 to 821) in each city.

Local stakeholders and Foundation partners defined the MC site in each city. They were guided by the parameters of the Making Connections initiative, which is directed at neighborhoods in which a large portion of the population faces barriers to connecting with social and economic opportunities and other resources in the region. Because the selection process was driven by local considerations, the sites vary in size and demographic composition. The population of the MC sites, from smallest to largest, is as follows: Louisville, 18,746; Denver, 19,557; Oakland, 25,721; Seattle, 28,373; Milwaukee, 29,493; Des Moines, 31,702; Providence, 38,718; Indianapolis, 39,374; Hartford, 39,698; and San Antonio, 133,646. Table 1 presents selected characteristics of the survey respondents by site. It can be seen that there is considerable variation in racial and ethnic composition and other respondent characteristics across the sites. The homeownership rates and economic status of the households also vary by site. Thus, even though Making Connections is aimed at distressed and disinvested urban neighborhoods,

there is considerable variation in the composition of the population across all of the sites.

Table 1. Make Connections Survey Demographics

	Denver (n = 779)	Des Moines (n = 786)	Indianapolis (n = 785)	San Antonio (n = 821)	Seattle (n = 792)	Hartford (n = 701)	Louisville (n = 703)	Milwaukee (n = 697)	Oakland (n = 697)	Providence (n = 735)	Total (n = 7496)
	%	%	%	%	%	%	%	%	%	%	%
Race/ethnicity											
Non-Hispanic White	29	51	36	6	53	5	16	11	10	13	23
Non-Hispanic Black	16	27	42	2	8	46	78	64	24	23	32
Hispanic	37	9	5	82	14	32	2	6	27	43	26
Asian	7	4	1	0	14	1	0	11	30	4	7
Other	12	10	17	11	11	18	4	9	9	17	12
Sex											
Male	33	36	32	30	42	32	35	29	43	31	34
Female	67	64	68	70	58	68	65	71	57	69	66
Age											
< 30	33	23	20	22	20	24	26	27	25	24	24
30-39	26	23	23	21	23	22	21	23	28	28	24
40-49	18	20	19	19	23	22	22	21	23	20	21
50-59	9	15	13	14	17	14	15	15	12	14	14
60+	14	19	24	23	16	18	16	13	13	14	17
Years in Neighborhood											
< 1	17	14	15	8	12	15	10	13	13	15	13
1 to 4	36	32	25	20	32	34	39	35	38	35	32
5 to 9	16	16	11	12	19	16	15	20	21	19	16
10 to 19	13	16	15	15	19	18	15	18	17	16	16
20+	19	22	34	44	20	18	20	14	12	16	22
Home owner	23	32	31	40	37	12	17	28	15	24	26
Household income											
< $10,000	39	23	24	26	14	38	49	33	22	24	29
$10-$20,000	21	26	31	34	15	25	26	25	27	30	26
$20-$30,000	13	23	22	22	14	18	12	19	21	17	18
$30,000+	27	28	22	19	57	19	13	23	31	29	27

Neighborhood measures

This survey, among other things, queried residents about the following neighborhood attributes using a number of multi-item scales: social cohesion and trust, shared expectations for informal social control,[1] neighborhood safety, disorder and incivility, and relations with police (See Table 2). Earlier in the interview, the residents were asked whether their neighborhood had a name; if they answered yes, they were asked for that name which was recorded verbatim. Also, a map of the area was presented by the interviewer and respondents were asked to mark the boundaries of their neighborhoods as they saw them.[2] Finally, the addresses of the survey respondents were geo-coded.

Analysis of individual responses to neighborhood questions

The first step in the analysis was to examine the reliability of each of the scales using the individual as the unit of analysis. The scales and their items appear in Table 2. We calculated Cronbach's alpha for each scale, which is a measure of internal consistency among the items. All of the scales proved to be reasonably reliable with this population. Therefore, we created summated scale scores for each individual respondent on the 5 scales of interest.

[1] Social cohesion and trust and shared expectations for social control make up the collective efficacy scale developed as part of the Project on Human Development in Chicago Neighborhoods (PCHDN) (Sampson, et al, 1997).

[2] Approximately 80% of respondents provided a name for their neighborhood and approximately 70% provided a usable map of their perceived neighborhood.

Table 2: Individual Level Reliability and Scale Items

Scale	Individual Level Reliability (α)	Items Included in Scale
Social Cohesion	.70	1. I live in a close-knit neighborhood 2. People in my neighborhood are willing to help neighbors 3. People in my neighborhood generally get along with each other 4. People in my neighborhood share the same values 5. People in my neighborhood can be trusted
Informal Social Control	.78	1. People in my neighborhood would scold a child who was showing disrespect to an adult or acting out of line 2. People in my neighborhood would do something about a child skipping school or hanging out on a street corner 3. People in my neighborhood would do something about a child spray painting graffiti 4. People in my neighborhood would do something about something about a fight 5. People in my neighborhood would do something about the closing of a fire station due to budget cuts
Neighborhood Safety	.70	1. My neighborhood is a safe place for children 2. I feel safe at home at night 3. I feel safe being out in my neighborhood alone during the day 4. If someone stopped me at night to ask directions, I would speak with them 5. On Halloween, most children go trick-or-treating 6. Most criminal activity in going in here is committed by people living outside of the neighborhood
Disorder and Incivility	.85	1. Graffiti on walls and buildings 2. Litter or trash on sidewalks and streets 3. Abandoned cars 4. Vacant, abandoned or boarded up buildings 5. Drug dealers, drug users, or drunks hanging around 6. Traffic safety problems 7. Gangs/gang activity 8. Bad odors from factory 9. Prostitution 10. Racial incidents
Police Relations	.85	1. Police are fair with residents 2. Police are polite with residents 3. Police are helpful with residents 4. Police are honest with residents 5. Police are quick to respond 6. Police speak my language

Definition of neighborhood units

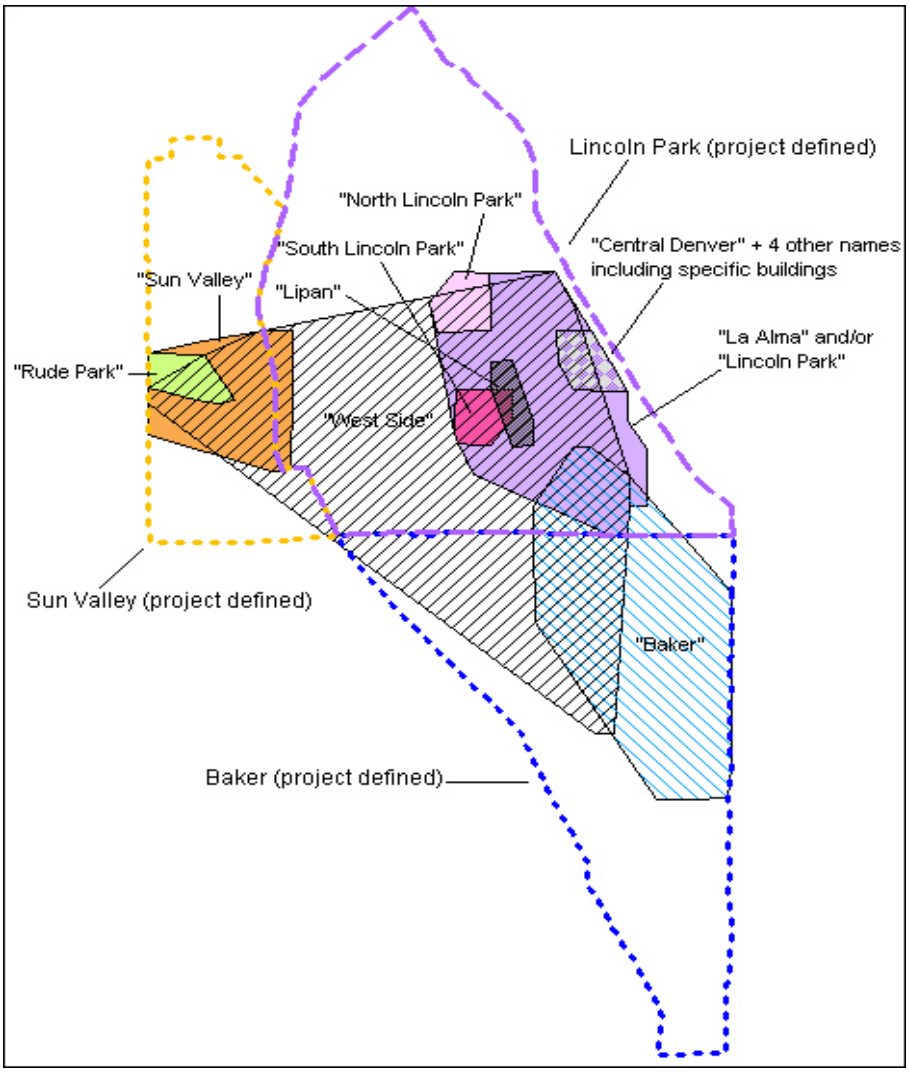
For each survey respondent, there were several identifiers of neighborhood. The place definitions corresponding to geography were: Making Connections (MC) site, project designated sub-area[3], census tract and census block group. Another way of designating the neighborhood, more symbolic than geographic, was to use the neighborhood name given by the respondents. We began with all of the names mentioned in the MC site and identified those names that were endorsed by multiple respondents.[4] Then a "named neighborhood" code was added to each respondent's record. The aggregate analysis of the neighborhood measures was performed for each of these five levels of neighborhood designation.

To clarify the idea of a named neighborhood, we show the case of Denver in Figure 1. Lincoln Park, Sun Valley and Baker are project designated sub-areas that were designated by the MC partners. These areas are shown by a broken line. Also shown are the names that survey respondents offered for the neighborhood. Some residents called their neighborhoods by the same names as the MC designated sub-areas, but many respondents offered different names. The shaded polygons show the areas where residents endorsed a particular name.[5] Thus "West Side" is the name given by some of the residents who lived in several of the project-defined sub-areas. Also, within project defined sub-areas, there are residents who identify their neighborhood by another name spread over a smaller space, such as "South Lincoln Park". Thus, it can be seen that

[3] These sub-areas were designated by local projects reflecting their approach to working with smaller areas within the larger MC site.
[4] The neighborhood names required some cleaning before the analysis began. For example, misspellings were corrected after checking with local sources of information.
[5] These named areas are mapped using a convex hull polygon, a GIS tool that places a boundary around the furthermost points at which the same name was given.

residents who share the same symbolic definition of the neighborhood, as reflected in a name, live interspersed with residents who share a different name. Moreover, some spaces are more clearly demarcated by name recognition, while in other spaces many names are used. For example, persons naming "Central Denver" live within a small area but there are four other names offered by residents in this same space. [6]

Figure 1. Named Neighborhoods on the West Side of Denver



Estimation of aggregate reliability

We created aggregate scale scores for various levels of geography: Named

[6] Portions of the project designated sub-areas are non-residential and did not have survey respondents.

neighborhood (n = 325), block group (n = 425), census tract (n = 130), project designated sub area (n = 27) and the whole Making Connections site (n = 10). The aggregate scores are equal to the mean of the valid values for the respondents in that neighborhood unit.

Next we calculated variance components for each unit of geography and calculated the intraclass correlation:

$$\rho = \tau^2 \quad / (\tau^2 + \sigma^2)$$

where τ^2 is the between neighborhood variance component and σ^2 is the variance component for respondents nested within neighborhoods. The variance components were also used to estimate a reliability (i.e. generalizability) coefficient for each item and the total scale scores. The aggregate reliability of a measure depends both on ρ and on the sample size for each geographic unit (n_j). Specifically, reliability is:

$$\lambda_j = \tau^2 \quad / (\tau^2 + \sigma^2/n_j).$$

If the sample size for a geographic unit is very large, λ_j approaches 1 even when the level of agreement among raters is relatively low (O'Brien, 1990; Raudenbush & Bryk, 2002). Thus, for purposes of comparison across the various definitions of neighborhood, the reliability of each measure was determined for a sample size of 25 raters. Since there are many more raters in this survey at larger geographic units, the actual reliability will vary for specific locations

Results

The scale means, intraclass correlations and the aggregate reliability coefficients are presented in Table 3 for the scales using the alternative neighborhood definitions. The scales differ to some degree in their aggregate reliability with police relations showing the highest reliability across all units of geography. For most scales, though, the

reliability is greater for smaller units of geography, reflecting the stronger consensus among respondents who live near each other. This gradient on reliability is steeper though for some scales than others. Specifically, the scales measuring perceived safety and disorder and incivilities seem to be more reliably measured at the smallest units of geography than at for the larger units. The size of the neighborhood unit does not matter as much for informal social control, social cohesion and police relations. A look at the items that make up these scales suggests a possible explanation for these differences. The safety and disorder and incivility items are generally more concrete and observable.

Table 3. Variation and aggregate reliabilities of neighborhood scales by definition of neighborhood*

Scale	MC Site	Project defined sub-area	Census Tract	Block Group	Named neighborhood
Neighborhood Safety					
intra-class correlation (ρ)	0.022	0.035	0.053	0.064	0.068
reliability (λ)[1]	0.364	0.476	0.583	0.632	0.646
neighborhood means (low, high)[2]	(4.20, 4.76)	(3.83, 5.00)	(3.38, 5.31)	(3.18, 5.88)	(3.63, 5.71)
Social Cohesion					
intra-class correlation (ρ)	0.037	0.047	0.078	0.081	0.070
reliability (λ)	0.487	0.552	0.678	0.688	0.653
neighborhood means (low, high)	(2.99, 3.46)	(2.90, 3.47)	(2.64, 3.80)	(2.59, 3.85)	(2.69, 3.80)
Informal Social Control					
intra-class correlation (ρ)	0.023	0.034	0.052	0.061	0.041
reliability (λ)	0.373	0.465	0.576	0.618	0.519
neighborhood means (low, high)	(3.17, 3.57)	(2.82, 3.60)	(2.66, 4.01)	(2.35, 4.46)	(2.67, 4.10)
Police Relations					
intra-class correlation (ρ)	0.072	0.066	0.103	0.100	0.099
reliability (λ)	0.661	0.637	0.742	0.736	0.732
neighborhood means (low, high)	(3.31, 3.96)	(3.17, 3.96)	(3.02, 4.40)	(2.72, 4.58)	(2.64, 4.33)
Disorder and Incivility					
intra-class correlation (ρ)	0.035	0.044	0.090	0.102	0.116
reliability (λ)	0.474	0.537	0.711	0.739	0.767
neighborhood means (low, high)	(2.14, 2.95)	(2.13, 3.32)	(1.25, 3.62)	(1.26, 4.10)	(1.31, 3.87)

1. Reliabilities are standardized across neighborhood definitions based on a sample size of 25 respondents per neighborhood

2. The range of scale score means is for neighborhood units where n >= 10

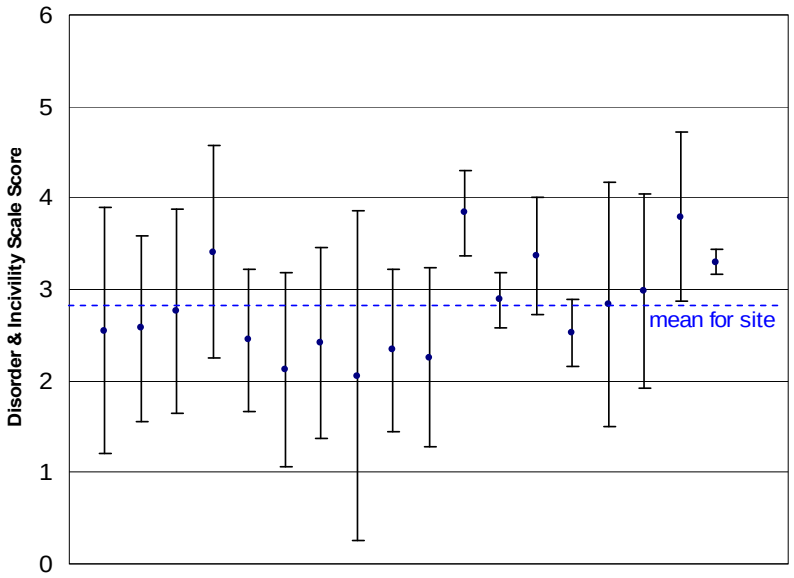
Therefore, the space across which observers would agree on the level of these things may be smaller. There may be more block to block variation on these types of conditions than on the more general perceived state of social relations or capacity reflected in the other scales.

The first four columns of Table 3 reflect geographic definitions of neighborhoods. Respondents' scores are aggregated together because their addresses fall within the boundary definitions. The fifth column, though, reflects a symbolic definition of neighborhood. Respondents who share the same name are aggregated together on each scale. But, as demonstrated in Figure 1, the actual geography of these names overlaps at many points. Nevertheless, the named neighborhood unit yields similar reliability coefficients as the block group level in most cases.

Over and above reliability, another aspect of selecting the units on which to measure neighborhood change is the range of scores such measures yield. In other words, if we assume that neighborhoods differ on attributes that these scales measure, we can ask which neighborhood unit is more sensitive to this variation. In Table 3, we show the neighborhood scores (i.e. mean respondent score within the neighborhood units). It can be seen that the range of scores is very small at the MC site level, but is considerably greater at the finer units of geography. Again, this gradient is steeper for perceived safety and disorder and incivilities than for the other scales. Figure 2 provides an illustration of the variation in scores on the disorder and incivilities scale among named neighborhoods within one site, Denver. The horizontal line represents the disorder and incivilities score for the MC site while the vertical lines show the mean and one standard deviation for each of the named neighborhoods. Some of the named neighborhoods' disorder and

incivilities scores come very close to the score for the entire MC site. However, many of the named neighborhoods have scores that are quite high, indicating that within the MC site there are pockets of severe disorder and incivility and this would be missed by only measuring the site as a whole.[7] Because the named neighborhoods are much smaller areas with the overall MC site, their distress is not well reflected in a measure made on a large space. Even if these high distress areas were to improve as a result of Making Connections, this change is likely to be obscured within the overall MC site.

Figure 2. Variation in Mean Disorder & Incivility Scale Scores for Named Neighborhoods of Denver



Conclusions

The Making Connections initiative is vitally interested in whether the neighborhoods in which it is working change over time. The household survey is only one of the data sources that will be used to address this question. However, the survey is

[7] The number of respondents within each named neighborhood unit vary; larger units contribute more to the overall mean of the Denver MC site.

particularly valuable because it captures the residents' observations of their neighborhoods. Thus, it important to explore how to analyze the survey so that the neighborhood measures are capable of detecting change at the scale at which it is likely to occur.

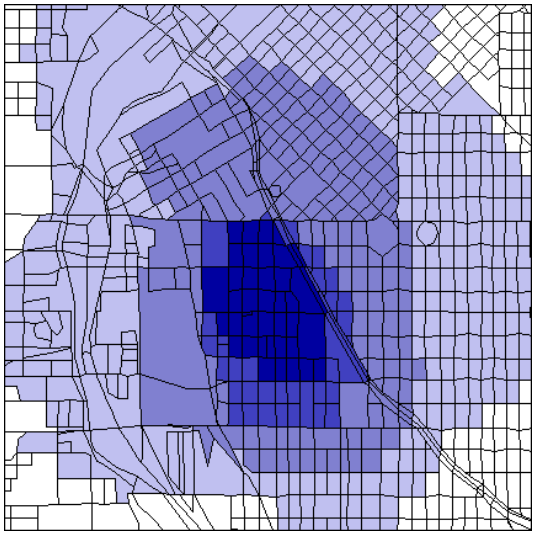
From this analysis, we conclude that the definition of the neighborhood unit does influence the reliability of these measures. Smaller areas are generally more reliable. Neighborhoods defined symbolically, such as the named neighborhood, also yield reliable measures on the concepts tested here. The choice of the neighborhood unit seems to matter more when the survey items ask about conditions that may be directly observable, such as the presence of graffiti, than when the questions require respondents to reflect on the feelings or behaviors of others, such as interpersonal trust. For the later types of items, respondents may base their opinions on a more geographically dispersed set of interactions.

Another reason for paying attention to the definition of neighborhood units is the fact that a community change initiative may not reach or be uniformly effective across the entire target area. Moreover, there is value to the stakeholders in knowing whether the neighborhood conditions vary within the overall target area so that they can shape their activities accordingly. The fact that the scale scores show more unit to unit variation when the unit is smaller suggests that reliable measures made upon smaller units may yield useful information for planning. The named neighborhoods may be especially useful because such symbolic groupings can serve as an important base for community organizing.

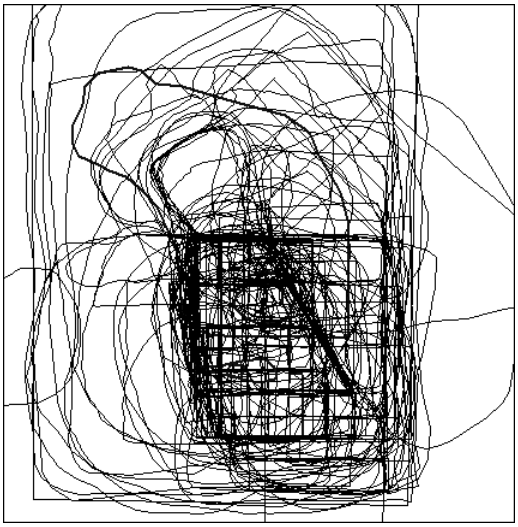
An important limitation of this analysis with respect to reliability is that the

number of neighborhood units at larger levels of geography was fairly small and the study was not representative of all neighborhoods in the metropolitan areas (Cook, Shagle & Degirmencioglu, 1997). In fact, the neighborhoods were restricted to central cities and the set of places that were targeted for Making Connections. It is likely that the scales used in this analysis would have had greater variance if more affluent areas had been included. Since between neighborhood variance is a component of the reliability coefficient, we believe our estimates of reliability are, therefore, lower bound estimates. Even though we found the aggregate reliability coefficients for these scales to be adequate for several neighborhood units, the within unit variation still begs the question of how residents envision their neighborhood when they are asked questions about it in a survey. We plan to explore this question further in the future by examining the maps residents drew of their neighborhoods. One question is whether these maps can be used to identify a space that residents endorse as being in their neighborhood. This would allow their observations to be aggregated across this "consensus" geography. Figure 3 provides an illustration of a possible approach to identifying such an area. In this figure are digitized, resident drawn maps from one project defined sub-area of Denver. All of the map boundaries are overlaid on the right side of the figure. Using GIS tools we identified the blocks within each individuals maps. For each block, we counted the number of residents who included that block within their neighborhood map. On the left side of the figure are the blocks shaded according to the percent of residents that endorsed it. We anticipate that further refinements of this approach may yield an additional way of crating a resident defined space for measurement.

Figure 3. Consensus area and resident drawn maps in "Lincoln Park"



Areas of conensus identified using GIS



Overlayed resident drawn maps

Consensus Area (>=50%)
Secondary Area (>=33%)
Tertiary Area (>=10%)
<10%

Measuring neighborhood change can be a costly undertaking and it is important to determine how community initiatives can assess their progress reliably and efficiently. Resident surveys are a valuable source of data because they gather perceptions from the individuals who are presumably knowledgeable about their neighborhoods through their own experience. However, if the spatial and social unit upon which the respondents are reflecting is not clear, the sensitivity of the measures to change will be compromised. Moreover, the potential error in measurement that is introduced by ambiguity in the neighborhood unit is compounded when multiple time points are compared. Conversely, if the units are well specified and residents are viewing the same phenomenon, reliable measures can be obtained with relatively small samples of observers.

Neighborhood surveys are a practical tool for community initiatives to assess the

ecological conditions that need to be addressed at the beginning (or baseline) and to chart their progress on changing these conditions over time. However, it is important that the surveys be designed to allow flexibility in the analysis with respect to the definition of the neighborhood units. Given the reality that residents may hold varying definitions of their neighborhoods, the aggregate reliability of neighborhood measures should not be assumed but carefully evaluated. In addition, community initiatives may benefit from applying GIS tools to their survey data to understand the spatial and symbolic representations of neighborhood common to the areas in which they work.

Finally, this analysis has implications for addressing questions about neighborhood effects on families and children. Much of the existing research defines neighborhoods as census tracts or groups of census tracts, but this study suggests that such units may contain sub-areas that differ, especially with respect to indicators of disorder such as safety, incivilities and police relations. Measures that are based on averages of these larger units may obscure important neighborhood variation and its influence on children and families. Moreover, the resident maps suggest that their perceptions of neighborhood as place are quite variable even among individuals who live in the same neighborhood according to externally imposed definitions. Research on neighborhood effects on families and children would benefit from exploring alternative methods of representing neighborhood, including methods that do not require specifying boundaries at all, but instead rely on patterns of spatial autocorrelation and distance (e.g. Case, Clapp, Dubin & Rodriguez, 2004). Indeed a weakness of current research is that it is not inherently spatial but typically treats neighborhoods as separate units regardless of contiguity or location. This research will benefit from further work that examines

symbolic, perceptual and spatial aspects of the processes through which neighborhoods influence their resident families and children.

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