What is the "neighborhood" in neighborhood satisfaction? Comparing the Effects of Structural Characteristics Measured at the Micro-neighborhood and Tract Level

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August 20, 2009

Post-print. Published in Urban Studies 47(12): 2517-2536

Word count (including references): 8,769

Running Head: "What is the "neighborhood" in neighborhood satisfaction?"

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[1] The research in this paper was conducted while the author was a Special Sworn Status researcher of the U.S. Census Bureau at the Triangle Census Research Data Center. Research results and conclusions expressed are those of the author and do not necessarily reflect the views of the Census Bureau. This paper has been screened to ensure that no confidential data are revealed.

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Abstract

Using the neighborhood sub-sample from the American Housing Survey for 1985, 1989, 1993, this study tests whether the social context of the local micro-neighborhood or of the broader census tract more strongly affects neighborhood satisfaction. We find that the local context of the micro-neighborhood generally has a stronger effect on residents' reported satisfaction. In contrast to studies aggregating to larger units, we find that greater residential stability in the micro-neighborhood increases reported neighborhood satisfaction. Low SES of the local micro-neighborhood decreases neighborhood satisfaction more than does the SES of the surrounding tract, and this effect is amplified in low-income tracts. Whereas prior evidence is mixed when aggregating perceptions of crime to larger units, we find a robust negative effect on satisfaction when aggregated to the micro-neighborhood.

What is the "neighborhood" in neighborhood satisfaction? Comparing the Effects of Structural Characteristics Measured at the Micro-neighborhood and Tract Level

Given the time that residents spend in the neighborhood in which they live, it is understandable that much scholarship has focused on the question of what leads residents to express more satisfaction with their neighborhoods. There is a growing realization in both theories and empirical research that contextual factors have important effects on neighborhood satisfaction. Characteristics of the socio-demographic context such as the presence of residential stability (Adams 1992), the degree of racial/ethnic heterogeneity (Connerly and Marans 1985; Sampson 1991), or the level of economic resources (Harris 2001; Sampson 1991; Stipak and Hensler 1983) may be particularly important for fostering satisfaction. Although this growing body of literature provides important evidence, left unaddressed is the question of the appropriate geographic area for measuring such contextual factors. Or phrased differently, what is the "neighborhood" in neighborhood satisfaction?

A consequence of failing to rigorously consider the appropriate level of aggregation is that the subsequent findings of studies can be indeterminate. That is, if studies consistently find that a hypothesized contextual construct does not exhibit the expected relationship with reported levels of neighborhood

satisfaction, does this indicate a failing of the theoretical model? Or does this suggest that such studies are simply measuring this construct at an improper geographic unit of analysis? For instance, aggregating such measures to units of analysis that are too large runs the risk of washing out effects that might otherwise be robust. If residents respond to the environment of their local micro-neighborhood, but the researcher measures the environment of the broader neighborhood (e.g., census tract), such effects may not be detected (Diggle 1993; Hipp 2007a; Lawson 1993; Lawson 2006).

Rather than assuming that a unit of analysis such as a census tract captures the appropriate geographic unit of analysis in which these contextual factors might work, a better approach relaxes this assumption by measuring differing aggregations. It may well be that a particularly small local context is what affects residents' sense of psychic attachment to, and satisfaction with, the neighborhood. Of course, there is no inherent reason that various social constructs posited to impact neighborhood satisfaction necessarily operate at the same geographic unit of analysis. In part, this may depend on the scope of the geographic area that residents consider to be part of their neighborhood (Coulton, Korbin, Chan, and Su 2001; Guest and Lee 1984; Haney and Knowles 1978; Lee and Campbell 1997). The question then is which context has the strongest effect on residents' reported neighborhood satisfaction?

To address these questions, an ideal approach would flexibly aggregate key constructs into different sized geographic units; however, such data are exceedingly difficult to acquire. This study instead utilizes a unique dataset that allows measuring these contextual constructs at two geographic units of analysis that may well be quite important: 1) the census tract (what prior work often refers to as a "neighborhood"); and 2) a cluster of eleven housing units (referred to here as a "micro-neighborhood"). This study aggregates key contextual measures specified by extant theory to these two geographic units to test which unit of analysis is more appropriate for capturing these effects for the reported neighborhood satisfaction of residents in these micro-neighborhoods. Whereas prior research is frequently limited to residents within a single city (or part of a city) at a single time point (Bolan 1997; Sampson 1991; Woldoff 2002), the present study utilizes a non-rural national sample at three time points, potentially allowing for more generalizability of the results.

Determinants of neighborhood satisfaction

Numerous studies have explored the determinants of residents' neighborhood satisfaction. An early wave of research focused on the relationship between the characteristics of households and reported neighborhood satisfaction (Bolan 1997; Davis and Fine-Davis 1981; Galster and Hesser 1981; Lee, Campbell, and Miller 1991; McHugh, Gober, and Reid

1990). However, this individual-level focus has increasingly given way to studies focusing on how the local context can also affect residents' reported satisfaction (Harris 2001; Lu 1999; Parkes, Kearns, and Atkinson 2002; Sampson 1991).

Prior to asking which measures of the context might impact reported neighborhood satisfaction, we need to focus on the question of what residents' define to be their perception of the "neighborhood". That is, how large is the area that persons are referring to when responding to such questions? Some studies have approached this question using variants of the strategy of cognitive (or mental) maps (Coulton, Korbin, Chan, and Su 2001; Guest and Lee 1984; Haney and Knowles 1978; Lee and Campbell 1997). One recurrent finding from this literature is the considerable variance in the size of the perceived neighborhood by respondents in the same study. Oftentimes, these respondents are living in the same geographic area as defined by a census tract or block group, and yet still maintain these different perceptions (Coulton, Korbin, Chan, and Su 2001). For instance, a study of 20 different areas in Seattle found that that perceptions of "neighborhood" ranged from being one's own block, up to wider than a ½ mile radius (Guest and Lee 1984). A study of Green Bay found considerable variation between inner-city, outer-city, and suburban residents (Haney and Knowles 1978). A study in Nashville found a standard

deviation twice that of the mean size of reported “neighborhoods”, suggesting considerable variability (Lee and Campbell 1997).

Furthermore, even focusing on the typical response by residents to the query regarding the size of the neighborhood shows some variability across studies. For instance, a study of Green Bay found that suburban residents drew neighborhoods of .16 square miles compared to those of .03 square miles by inner-city residents (Haney and Knowles 1978). To some extent, these size differences reflect the difference in population density between urban and suburban areas. Thus, these sizes are closer to those of block groups. A study of 20 different areas in Seattle found that about 44% of their respondents defined the neighborhood as being no more than one block in each direction of their own block, 32% defined it as being larger than this but within a ½ mile radius (.79 square miles), and about 19% defined it as wider than a ½ mile radius (Guest and Lee 1984). Thus, a number of people in this study defined the neighborhood as something closer to the size of a census tract. A study of 81 blocks in South Nashville found that the mean size of reported “neighborhoods” was about 15 blocks (Lee and Campbell 1997): this is about 1 ½ block groups, suggesting an intermediate geographic area. A more recent study of seven block groups in Cleveland found that the mean neighborhood size was .32 square miles, approximately the size of census tracts in this urban study area (Coulton, Korbin, Chan, and Su 2001).

Understanding the size of the geographic area that respondents are referring to when describing the neighborhood is important if we then wish to estimate the effects of this context on reported neighborhood satisfaction. This variability in the perceptions of the size of the neighborhood in these previous studies suggests possible differences across respondents for the salient context. Nonetheless, studies of the effect of neighborhood context rarely take into account the proper level of aggregation for producing satisfaction (Connerly and Marans 1985; Jagun, Brown, Milburn, and Gary 1990; Parkes, Kearns, and Atkinson 2002) Thus, although a common theme from these studies is that the social demographic characteristics of neighborhoods appear even more important for fostering a sense of satisfaction than the physical characteristics, we have little guidance on what is the appropriate geographic context for measuring these constructs (Herting and Guest 1985). We therefore consider next why certain characteristics of the social context might matter, and over what geographic aggregation.

Perceptions, crime, and social ties

There are at least three possible explanations for why the social characteristics on a local neighborhood level might impact neighborhood satisfaction: 1) it might affect the presence of social ties; 2) it might impact the perception that persons are engaging in various undesirable activities (e.g., loitering, committing vandalism); 3) it might affect the safety of the

neighborhood (either real or perceived). That is, social disorganization theory posits that certain structural characteristics of the neighborhood—residential stability, racial/ethnic heterogeneity, economic resources, and broken households—affect the creation of the social ties that would otherwise enable a neighborhood to provide the social control necessary to address crime and disorder when it appears (Hipp 2007b; Markowitz, Bellair, Liska, and Liu 2001; Sampson and Groves 1989; Shaw and McKay 1942; Warner 2003). It is reasonable to suppose that the ensuing crime and disorder affects residents' perceptions of safety, which would likely reduce satisfaction with the neighborhood. As a consequence, recent research has used the social disorganization model to explain neighborhood satisfaction or attachment (Markowitz, Bellair, Liska, and Liu 2001; Taylor 1996; Woldoff 2002). Beyond their possible effect on neighborhood crime, these social ties also likely directly increase residents' sense of attachment to the neighborhood (Austin and Baba 1990; Connerly and Marans 1985; Hipp and Perrin 2006; Hunter 1975; Kasarda and Janowitz 1974; Lee, Campbell, and Miller 1991; Mesch and Manor 1998; Sampson 1991) and feelings of satisfaction (Adams 1992; Connerly and Marans 1985; Davis and Fine-Davis 1981; Lee, Campbell, and Miller 1991; Parkes, Kearns, and Atkinson 2002; Sampson 1988; Sampson 1991). The presence of fellow residents with certain characteristics might also impact one's perception of familiarity with, and trust of, one's neighbors

(Putnam 2000). For all of these mechanisms, it is important to consider the appropriate geographic aggregation for fostering such effects.

When considering the effect of network ties, the key question is what geographic area defines the social interactions of residents? Some research has suggested that social interactions with fellow residents occur most frequently with those living in one's same micro-neighborhood, and that interactions drop off considerably with residents living on surrounding streets (Caplow and Forman 1950; Festinger, Schachter, and Back 1950; Hipp and Perrin 2009). This would imply that the close ties fostered within a small micro-neighborhood bring about increased satisfaction with the neighborhood. On the other hand, a consequence of the greater raw number of possible interactions with residents in the larger area (given the larger population base than that of the micro-neighborhood) may be that individuals have as many or more social interactions with residents outside of their micro-neighborhood despite the lower probability of interaction with any given co-resident. Thus, although residents would be more likely to form a tie with someone living in their own micro-neighborhood (using the micro-neighborhood population as the denominator), a higher percentage of their total ties might occur with residents in adjacent micro-neighborhoods.[1] This would imply that ties linking into the broader neighborhood are more important for fostering satisfaction, suggesting that it would be more appropriate to measure residential stability or

racial/ethnic heterogeneity in the broader area rather than in the local micro-neighborhood.

When considering the effect of perceptions of the neighborhood environment, we have little empirical guidance on their geographic scope. It seems reasonable to presume that the insights from the literature focusing on residents' perceptions of the size of the neighborhood are salient here. That is, if residents define their "neighborhood" as constituting one square mile, it is likely that they would be impacted by all of the residents they encounter in that area, but unaffected by residents they encounter outside that area. That is, residents outside these perceptual boundaries likely have less impact on one's perceptions of neighborhood satisfaction given that they are defined as "outside" the neighborhood. Nonetheless, the great variability in reported sizes of "neighborhoods" makes an a priori selection of the appropriate geographic aggregation quite difficult.

Given these considerations, what geographic area should matter for various social structural measures defined by the social disorganization theory? This is not always clear.

For instance, residential stability might increase neighborhood satisfaction by fostering more social ties among residents, or because it creates a *perception* of recognizing more persons and hence a sense of familiarity. The geographic unit at which these social ties or perceptions matter is unclear.

Indeed, there is mixed evidence for the effect of aggregated residential stability on neighborhood satisfaction. Although one study found a positive relationship between residential stability in small towns and neighborhood *attachment* (Rice and Steele 2001) other studies aggregating to tracts have failed to detect such a relationship (Connerly and Marans 1985; Sampson 1988). And whereas one study of tracts found the expected positive effect of residential stability on neighborhood *satisfaction* (Adams 1992), another study failed to detect this effect (Connerly and Marans 1985). It should be highlighted that prior studies almost always measure stability at the geographic level of census tracts, which may simply be too crude a level of aggregation to capture this effect.

Likewise, the level of racial/ethnic heterogeneity in a neighborhood might reduce social interaction among residents (Sampson and Groves 1989), or it might simply bring about a perception of greater mistrust in the social environment (Rice and Steele 2001). The appropriate geographical unit of analysis is not clear, although prior empirical evidence suggests a robust effect regardless of the geographic unit of analysis employed. Studies using such varied samples as the 1975 Detroit survey (Connerly and Marans 1985), a sample of 99 small Iowa towns (Rice and Steele 2001), and a 1984 sample of 11,030 residents of 500 units about the size of census tracts in Great Britain (Sampson 1991) have found a negative relationship between racial/ethnic heterogeneity and reported satisfaction or attachment. Although one study

failed to find a significant relationship at the census tract level (Adams 1992), this may be because of this study's employment of a rather crude dichotomized measure of heterogeneity .

There are also differing views on why the socio-economic context might affect neighborhood satisfaction. This may occur because higher SES residents participate in more voluntary organizations (Beyerlein and Hipp 2006; Miner and Tolnay 1998; Oliver 2000; Oliver 1984; Swaroop and Morenoff 2006), and these voluntary organizations then help to combat crime (Sampson and Groves 1989). Or it may be that high SES neighborhoods are better able to obtain services from the larger community that help in reducing neighborhood crime, as well as lobbying for more desirable amenities (Guest 2000; Hunter 1995). The question then is determining the appropriate geographic unit through which either of these mechanisms would operate. Studies have generally only tested this contextual effect at larger geographic levels, finding a positive relationship of neighborhood satisfaction with average SES (Sampson 1991) and average income (Stipak and Hensler 1983) in census tracts, and a negative relationship with poverty in zipcodes (Harris 2001). It is therefore an open question whether SES measured at the micro-neighborhood level might more appropriately capture how this process works.

Although social disorganization theory posits that broken households might affect neighborhood crime by limiting the ability to provide social

control for their own children as well as neighbors' kids that would otherwise reduce the amount of crime and disorder, it is not immediately clear why this might directly impact neighborhood satisfaction (beyond its effect on crime and disorder). One possibility is that this may affect residents' general perceptions of the quality of the neighborhood by signaling a general lack of control. Indeed, one study found that the presence of broken households directly reduced satisfaction even when taking into account the level of crime and disorder in the census tract (Sampson 1991). On the other hand, the presence of children in households may act as a conduit to increase contact among parents (Hipp and Perrin 2009) and hence increase neighborhood social ties (Sampson 1988; Sampson 1991). Nonetheless, studies have generally failed to test whether such a contextual effect from the presence of children exists in neighborhoods. Furthermore, the geographic level at which these processes might operate has not been considered.

Underlying parts of the above discussion is the postulate that these social characteristics likely impact neighborhood crime or disorder—or the perception of them—which then impacts neighborhood satisfaction. Indeed, studies have found that neighborhood satisfaction is reduced by *perceptions* of crime (Adams 1992; Greenberg 1999; Harris 2001; Parkes, Kearns, and Atkinson 2002), and *fear* of crime (Hartnagel 1979). Likewise, research has found that perceived social or physical disorder reduces neighborhood

satisfaction (Davis and Fine-Davis 1981; Greenberg 1999; Harris 2001; Lu 1999; Woldoff 2002). However, there is less evidence that crime or disorder as neighborhood-level contextual measures actually impact neighborhood satisfaction once accounting for these perceptions, causing some to argue that this is only a psychological effect (Taylor 2001). Whereas one study found that the tract victimization rate was negatively related to neighborhood *attachment* (Sampson 1991), a study found that the crime rate had no effect on neighborhood satisfaction after accounting for individual perceptions (Adams 1992), and another study likewise found no effect from aggregated perceptions of crime or disorder (Taylor 2001). Nonetheless, the evidence that residents' perceptions of crime and disorder are substantially related to independent measures of crime and disorder (Perkins and Taylor 1996; Sampson, Raudenbush, and Earls 1997; Skogan and Maxfield 1981) would suggest that such neighborhood-level measures should also affect neighborhood satisfaction. One possibility is that measuring aggregated crime and disorder at the level of the census tract is simply too large a level of aggregation if crime rates vary over the blocks in a tract.

Summary

We will utilize a unique dataset to address these research questions and ascertain whether the key neighborhood structural characteristics of racial/ethnic composition, SES, residential stability, and broken households

have stronger effects on a resident's assessment of neighborhood satisfaction when aggregated to the level of the local micro-neighborhood, or to the level of the broader neighborhood as measured by a census tract. We use a sample of households nested in both micro-neighborhoods and tracts to test which level of aggregation is most important for impacting reported neighborhood satisfaction. We also test if perceptions of crime and disorder aggregated to micro-neighborhoods affect neighborhood satisfaction, in contrast to the generally null findings from studies aggregating these to census tracts. We describe the data next.

Data and Methodology

Data

We employed the neighborhood sub-sample of the American Housing Survey (AHS) to address these research questions. The AHS is a national sample of about 60,000 housing units conducted every other year (for a more complete description of the AHS sampling design, see Hadden and Leger 1995). For this special neighborhood sub-sample, the AHS initially randomly selected about 660 housing units in 1985 from the full AHS that were located in either urban or suburban locations. They then interviewed the ten closest neighbors of the initial respondent in 1985, 1989 and 1993. The samples were augmented in each of the two latter years with micro-neighborhoods taken from

new housing developments. We did not include micro-neighborhoods with fewer than 5 households (this was just 2.2 percent of the micro-neighborhoods), yielding a total sample of 25,332 household time points within 2,256 household cluster time points. In a typical metropolitan area, a micro-neighborhood will be approximately a single double-sided street block. We placed these micro-neighborhoods into their respective census tracts using special access to data at a Census Research Data Center. The median census tract in 2000 was about 1.4 miles across (1.95 square miles), with a mean of about 4,300 residents (95% of the tracts contain between about 1,400 and 8,000 persons), and they were initially constructed by the Census Bureau to be relatively homogeneous neighborhoods (Green and Truesdell 1937; Lander 1954).

Outcome measure

The key outcome measure is a single question asking the respondents their satisfaction with the neighborhood (on a 0 to 10 scale). There are about eleven respondents in each micro-neighborhood reporting their individual level of satisfaction, and their aggregated responses can be considered a measure of micro-neighborhood-level neighborhood satisfaction. which can be considered separate indicators of micro-neighborhood-level neighborhood satisfaction.

Micro-neighborhood- and tract-level predictors

To account for the possibility that perceived crime and disorder affect reported neighborhood satisfaction, we included three measures at both the

household- and micro-neighborhood-level. The AHS asks respondents a series of three questions regarding perceptions of crime: is crime a problem, is it so much of a problem that it's a bother, and is it such a bother that the respondent wishes to move. We combined these responses into a four-point response. We created a physical disorder measure as a factor score based on principal components analysis combining the responses of a four-category variable assessing street noise (not a problem; problem; bothersome; wish to move) and three yes/no questions assessing whether the following issues are bothersome in the neighborhood: 1) litter/housing deterioration; 2); poor city services; 3) noise in general. The social disorder scale combines two yes/no questions asking whether the following are bothersome: 1) people in the neighborhood and 2) undesirable non-residential users. We included these household-level measures in the models, and also included as aggregated measures the average factor score of households in the micro-neighborhood.

The key measures of the social disorganization theory were constructed at both the micro-neighborhood and the tract level. The micro-neighborhood measures are constructed by summing the responses of the eleven adjacent AHS residents, and the tract measures are summed responses to the U.S. Census. Racial/ethnic heterogeneity (EH) is measured in the micro-neighborhood or tract (k) with the Herfindahl index (Gibbs and Martin 1962: 670) of whites, African Americans, Latinos, Asians and other race:

(1) $$EH_k = 1 - \sum_{1}^{j=J} G_j^{\,2}$$

where G represents the proportion of the population of ethnic group *j* out of *J* ethnic groups. To account for possible racial/ethnic composition effects beyond the effect of racial/ethnic heterogeneity, measures of the percent African-American and percent Latino were constructed. We included two measures of SES: economic resources were measured as the average income in the micro-neighborhood or tract, and possible cultural capital effects of education were captured with measures of the average education level of the micro-neighborhood and the percentage in the tract with at least a bachelor's degree. Residential stability in the neighborhood was measured with a factor score based on a principal components analysis of the average length of residence and the percent homeowners in the micro-neighborhood or tract. To account for the presence of broken households, variables were constructed for the percent married at the micro-neighborhood level, the percent divorced at the tract level, and the percent of households with children less than 18 years of age. Thus, the linear combination of divorced households and households with children is a measure of broken households.

Control variables

To minimize the possibility of spurious findings, we also accounted for several other characteristics of the micro-neighborhood and tract that might affect reported neighborhood satisfaction. We included measures of the percent vacant units in the micro-neighborhood or tract (as these are likely undesirable). We included measures of the average age of residents, as the relative quiet of older residents might cause less dissatisfaction. Given that crowding may decrease neighborhood satisfaction, measures of the average number of persons per room in the micro-neighborhood and the tract were constructed.[2]

We also accounted for key household level measures that might affect reports of neighborhood satisfaction. We therefore included measures of the household's length of residence in the unit (logged), household income, their race (African American, Latino, other race, with white as the reference category), marital status (married, divorced widowed, with single as the reference category), the presence of children less than 18 years of age, whether the unit is owned, the respondent's age, years of education, and gender. The summary statistics for the variables used in the analyses are shown in Table 1.

<<<Table 1 about here>>>

Methodology

We estimated multilevel models in SAS 9.1. The household-level equation estimated is:

(3) $$y_{ik} = \eta_k + \Gamma X_{ik} + \varepsilon_{ik}$$

where y_{ik} is neighborhood satisfaction reported by the *i*-th respondent of *I* respondents in the *k*-th micro-neighborhood, η_k is the random micro-neighborhood-level component of neighborhood satisfaction in the micro-neighborhood, X_{ik} is a matrix of the exogenous predictors with values for each individual *i* in micro-neighborhood *k*, Γ shows the effect of these predictors on the subjective assessment, and ε_{ik} is a disturbance term.[3]

The equation of substantive interest in this study is the neighborhood-level equation. Adding neighborhood predictors results in this second equation:

(4) $$\eta_k = B_{MN}Z_k + B_T Z_j + B_{YR}YR + \varepsilon_k$$

where η_k represents the overall neighborhood satisfaction in micro-neighborhood *k*, Z_k represents a matrix of variables measured at the level of micro-neighborhood *k*, B_{MN} shows the effect of these measures on overall satisfaction, Z_j represents a matrix of variables measured at the level of tract *j*, B_T captures the effect of these measures, YR are indicators of the year in which the neighborhood was observed (with the first wave as the reference category) with B_{YR} vector of effects, and ε_k is a disturbance for micro-neighborhood *k*.

Since almost no tracts contain multiple micro-neighborhoods, it is not feasible to treat the census tract as an additional level in the multilevel framework. While this precludes comparing the degree of variance existing at

the micro-neighborhood- and tract-level, it also alleviates concerns about improper estimation of standard errors as the tracts do not constitute an additional level of nesting since they are nearly coterminous with micro-neighborhoods. The design does not include tracts as a sampling cluster but rather they and the micro-neighborhoods arise from the initial sampling selection of a household, thus no bias occurs in the coefficients (Angeles, Guilkey, and Mroz 2005).

We estimated four models: 1) a model containing the micro-neighborhood-level measures; 2) a model that replaces the micro-neighborhood-level measures with the tract-level measures to compare the effect of these structural characteristics when measured at these two different geographical aggregations; 3) a model simultaneously including the micro-neighborhood- and tract-level measures; 4) a model also including our micro-neighborhood level measures of commonly perceived crime, social disorder, and physical disorder.[4] We accounted for the household characteristics in all models. In addition to including dummy variables indicating the year of the sample, we used robust standard errors to account for the possibility that some households appeared in the sample up to three times.[5]

Results

We first point out that a common theme in our results is that the local micro-context appears more important than the broader census tract context. For instance, we see evidence in Table 2 that residential stability is important when measured at the level of the micro-neighborhood. Residents living in micro-neighborhoods with one standard deviation more residential stability report .06 standard deviations more satisfaction with the neighborhood (β = .06).[6] This contrasts with the mixed findings of prior studies using tract-level measures of residential stability. Indeed, whereas model 1 using a micro-neighborhood-level measure of residential stability has a positive effect, there is no effect for the tract-level measure in model 2. And this micro-neighborhood-level effect remains significant in model 3 when including measures of both micro-neighborhood- and tract-level measures. These findings suggest that such residential stability appears to work at a very micro geographic level.

<<<Table 2 about here>>>

We also see that SES increases neighborhood satisfaction, and does so most strongly when it occurs in the micro-neighborhood. Greater economic resources only increase satisfaction when measured at the level of the micro-neighborhood. Increasing the average income in the micro-neighborhood increases satisfaction in model 1 (β=.13). The effect of average income in the tract is not significant in model 2, and when including both the micro-

neighborhood- and tract-level measures in model 3 we see that only the micro-neighborhood effects are associated with greater neighborhood satisfaction. We do see in models 1 and 2 that residents in neighborhoods with more highly educated persons report more satisfaction, whether this is measured at the micro-neighborhood (β=.22) or tract (β=.14). In model 3 when including both of these levels of aggregation simultaneously we see that the presence of educated residents has a stronger effect when it occurs in the micro-neighborhood.

The effect of racial/ethnic heterogeneity is more consistent over both of these levels of aggregation. Whether measured at the micro-neighborhood level in model 1 or the tract-level in model 2, higher levels of racial/ethnic heterogeneity reduce neighborhood satisfaction. It is inappropriate to interpret the heterogeneity and composition coefficients separately given their interdependence, so we graphically plot these effects for a Latino, African American, or white resident in four hypothetical micro-neighborhoods: 1) nearly all white (90% white, 5% African-American, 5% Latino), 2) nearly all Latino (90% Latino, 5% African-American, 5% white), 3) nearly all African-American (90% African-American, 5% white, 5% Latino), and 4) equal amounts of all five groups (high heterogeneity). The results in Figure 1 from model 1 show that micro-neighborhoods with high levels of racial/ethnic heterogeneity have the lowest levels of reported neighborhood satisfaction. For

instance, whereas a white respondent reports the most satisfaction when they reside in a nearly all-white micro-neighborhood (predicted neighborhood satisfaction score of 7.74), this satisfaction is lower when they reside in a mostly black micro-neighborhood (7.30), mostly Latino micro-neighborhood (7.49), or racially/ethnically mixed micro-neighborhood (7.47). An African American or a Latino respondent also reports less satisfaction when residing in a racially/ethnically mixed micro-neighborhood but they report the most satisfaction when residing in a nearly all-white micro-neighborhood (7.93 and 8.00 respectively). In model 2, it appears that racial/ethnic heterogeneity has its strongest effect when measured at the tract level as such neighborhoods engender the least satisfaction for all residents.

<<<Figure 1 about here>>>

We see that the presence of broken households has an equally strong effect when measured at the micro-neighborhood or tract-level. Households living in micro-neighborhoods with more married households report more satisfaction, regardless whether including only the micro-neighborhood-level measures in model 1, or when also including the tract-level measures in model 3. There is no evidence of a positive effect from the presence of children, as a higher percentage of households with children in the micro-neighborhood or tract actually *reduces* neighborhood satisfaction (β=.05). These combined coefficients in this additive model imply that more divorced households with

children in the tract have a particularly strong negative effect on reported neighborhood satisfaction. For instance, a one standard deviation increase in the proportion divorced reduces neighborhood satisfaction .244 units whereas a one standard deviation increase in the proportion of households with children less than 18 years of age reduces neighborhood satisfaction .156. Combining these marginal effects, this implies that the most satisfying tract will have a low proportion of divorced households with no children (a marginal effect of .40), the next satisfying is a tract with a low proportion of divorced households with children (a marginal effect of .088), whereas tracts with a high level of divorced households with no children (-.088) or divorced households *with* children (-.40) have the strongest negative effect on neighborhood satisfaction.[15] The pattern of results is the same when measuring these constructs at the micro-neighborhood level. Note that these effects are observed beyond any effect they may have on perceived crime and disorder—which are accounted for in this model.

In model 4, we added our measures of micro-neighborhood-level aggregation of perceived crime, social disorder, and physical disorder. This model shows that aggregating the perceptions of crime to the micro-neighborhood level yields reduced levels of neighborhood satisfaction. These findings contrast with prior studies that have failed to find a relationship when aggregating such perceptions to the geographic level of census tracts. Even

when including measures at the level of the household, micro-neighborhood, and tract, it is still the case that aggregated perceived crime reduces neighborhood satisfaction (β= -.08). The results of the model imply that households perceiving more crime and disorder are less satisfied (as evidenced by the substantial household-level coefficients), but there is also an aggregated effect from the micro-neighborhood for perceived crime, arguing against a purely psychological explanation.

In ancillary models, we also tested for moderating effects across micro-neighborhoods and tracts. Specifically, we tested whether a construct measured in the broader census tract moderated the effect of the same construct measured in the local micro-neighborhood. We only found significant results for the interaction of aggregated household income. We graphically depict these effects for micro-neighborhoods and tracts at the mean of average income, one standard deviation above the mean, and one standard deviation below the mean in Figure 2. This figure demonstrates that in low average income micro-neighborhoods (the left hand side of the figure), satisfaction is relatively low. However, this satisfaction is particularly low if it occurs in a micro-neighborhood located in a low income tract. On the other hand, for those living in a high income micro-neighborhood, the level of income in the surrounding tract makes little difference (the right hand side of the figure). Thus, we see

that the effect of income in the micro-neighborhood has minimal effect if the broader tract has a relatively high level of income.

<<<Figure 2 about here>>>

We briefly note the effects of our aggregated control variables. Vacant units appear to have their strongest effect when measured at the broader census tract level. In contrast, the effect of more elderly residents parallels that of residential stability, as they have a stronger effect when measured in the local micro-neighborhood. Although we see that more crowding (as measured by persons per room) reduces satisfaction whether measured locally or in the broader tract, its effect is strongest when measured in the local micro-neighborhood, as we see that tract effect is only moderately significant in model 3.

Finally, we observe that the household and individual-level measures generally show the expected effects, and highlight that several of these measures show similar effects in the model accounting for the micro-neighborhood measures and the model including both micro-neighborhood and tract measures, but considerably different-sized effects in the model only accounting for the tract-level measures. This pattern implies that the tract-level measures are not capturing the key context of the micro-neighborhood. For instance, although African Americans and Latinos report more satisfaction with the neighborhood, these effects are weaker in the model that does not account

for the micro-neighborhood context. Recall that in the micro-neighborhood model, the aggregated effect of Latinos and African Americans showed a strong negative effect on satisfaction: failing to account for this in the model leads to a conclusion that the individual-level effect is weaker than it actually is. Likewise, those who have more education report less satisfaction with the neighborhood, though this effect is weaker in the model only including the tract-level measures. And those who own their unit are more satisfied, and these effects appear even stronger when not accounting for the micro-neighborhood context. Finally, married residents and higher income households appear more satisfied only in the model not accounting for the micro-neighborhood context, as this appears to be a contextual effect.

Conclusion

Although prior studies have suggested that the social characteristics of a geographic area are related to the level of neighborhood satisfaction, studies have rarely considered the appropriate level of geographic aggregation. This study has explicitly focused on this question by comparing the results of two levels of aggregation for such social characteristics: the local micro-neighborhood and the broader neighborhood as measured by the census tract. The results consistently showed that the socio-demographic characteristics of the local micro-neighborhood appear to be more important than those of the

broader neighborhood for affecting residents' reported level of satisfaction with the neighborhood. These findings are important given that most prior work aggregates such measures to geographic units at least the size of census tracts (Adams 1992; Sampson 1988; Sampson 1991), if not even larger geographic units (Harris 2001).

One notable finding was that whereas prior studies have generally found quite mixed results for the effect of residential stability on neighborhood satisfaction, the results here suggest that this may simply reflect that too large a level of aggregation was employed. We found that the residential stability of the micro-neighborhood has a strong positive effect on neighborhood satisfaction, whereas the residential stability of the broader census tract showed no such effect. This null result when measuring residential instability aggregated to the census tract parallels prior work also finding no effect for tract-level residential stability (Connerly and Marans 1985). This suggests that the cohesion and attachment to the neighborhood that the systemic model hypothesizes will develop in areas with high levels of residential stability may be more likely to play out at the micro-neighborhood level of households living on the same street. This finding has important implications for future research wishing to test such a relationship using larger geographic units of analysis.

Whereas there was some evidence that the presence of more highly educated persons in the broader neighborhood increased satisfaction, the

presence of more high income and highly educated households in the local micro-neighborhood showed considerably stronger effects on neighborhood satisfaction than did this broader context. As we noted above, there are several possible reasons why the presence of highly educated or high income residents may result in more reported satisfaction, such as participation in voluntary organizations and obtaining needed resources for the neighborhood from the broader community. Disentangling precisely why this might occur requires future studies to focus on the posited mechanisms bringing about these relationships. To the extent that this effect occurs because such high SES residents participate more frequently in voluntary organizations in the neighborhood that address problems and increase general satisfaction, this suggests one possible direction for future research. Whereas one study found that residents who were more active in voluntary organizations reported more satisfaction with the neighborhood (Jagun, Brown, Milburn, and Gary 1990), studies have rarely tested for a possible aggregated effect from such organization participation. Nonetheless, the fact that we found this effect to operate to operate more strongly at such a small geographic unit suggests that future work will need to avoid aggregating to units that are too large.

It was also notable that the effect of average income in the micro-neighborhood on satisfaction was moderated by the level of income in the surrounding tract. Living in a low income micro-neighborhood is particularly

undesirable if it is surrounded by a low income area. It appears that living in a low income micro-neighborhood is more tolerable if the broader area has a higher level of income. This implies that clustering low income households into particular geographic areas is particularly undesirable to their residents. The implication of this finding is supportive for the general philosophy of New Urbanism developments of mixing types of housing units: whereas those living on a low income block prefer having high income households nearby, those living on a high income block are only modestly affected by the presence of lower income households in the surrounding area.

Although we found that racial/ethnic heterogeneity negatively impacts satisfaction regardless whether it is measured in the local micro-neighborhood or the broader tract, the negative effect of racial/ethnic minorities was only detected at a very micro-level. That is, residents, regardless of their race/ethnicity, reported less satisfaction when living in micro-neighborhoods with more Latinos or African Americans (ancillary models testing for interactions between the race/ethnicity of the respondent and the racial/ethnic composition showed no significant effects). Although Sampson and Raudenbush (2004) postulated that the presence of minorities is used as a signal for the presence of disorder and crime, our models accounted for such perceptions. The fact that this effect was only detected at a very micro geographic level argues against it being a cue about the broader context (e.g.,

the quality of schools). Nonetheless, what this might signal is not clear, and suggests a needed avenue for future research.

Paralleling the effects for the socio-demographic composition, it appears that when accounting for the level of crime and disorder in the local context researchers should avoid aggregating to a unit that is too large. We found that not only did individuals' perceptions of crime and disorder strongly reduce neighborhood satisfaction, but that there was an aggregated effect in which residents living in micro-neighborhoods with more commonly perceived crime reported lower levels of neighborhood satisfaction. These robust findings contrast with the quite weak findings in prior studies that frequently aggregate such measures to census tracts. Given that crime can vary considerably across the micro-neighborhoods *within* a given census tract, this implies that aggregating to larger units of analysis risks washing out otherwise robust relationships. Thus, it may be folly to presume that the actual levels of crime in neighborhoods are of less importance than residents' *perceptions* of these characteristics. Instead, it appears that measuring commonly perceived crime at a more appropriate geographic unit of analysis reveals a robust relationship.

Certain limitations to our study should be acknowledged. First, while an important innovation was simultaneously taking into account measures constructed at the micro-neighborhood as well as the census tract level—and finding that this small micro-neighborhood unit of analysis appeared to have

particularly strong effects—it is possible that other geographic units of analysis might be even more appropriate. For instance, Grannis (1998) found that aggregating to the level of block groups (a unit of analysis about 1/3 the size of census tracts) resulted in relatively good approximations of relatively homogeneous units of analysis based on race/ethnicity. Future studies will want to test different geographic levels of aggregation; ideally, flexible geographic units of aggregation would allow exploring this more closely. Second, a key challenge to neighborhood studies is the possibility of selection effects: certain types of people may choose to move to more desirable neighborhoods. The cross-sectional analyses presented here cannot account for this. Third, this study focused on testing which contextual characteristics—and at what level of aggregation—are related to neighborhood satisfaction, rather than testing the mechanisms explaining these relationships. Studies explicitly measuring the mechanisms posited by these theories would arguably help in disentangling the proper geographic level of analysis. Fourth, this study employed a measure of neighborhood satisfaction consisting of a single question about global satisfaction. Although neighborhood satisfaction studies frequently employ such a measure, future research might measure separate dimensions of neighborhood satisfaction.

Despite these limitations, this study provides key insight into the generation of neighborhood satisfaction among residents. A key takeaway

point is that it appears that the local context of the micro-neighborhood appears more important when aggregating various social characteristics rather than larger neighborhood-type measures such as census tracts. For instance, it appears that residential stability measured at the level of the micro-neighborhood has a robust positive effect on neighborhood satisfaction, in contrast to the limited evidence of such an effect from studies aggregating this measure to census tracts. Likewise, the aggregated effects of perceived crime were very robust in this study when aggregated to the level of the micro-neighborhood, in contrast to the weak findings of prior research aggregating this measure to the level of census tracts, or even larger units. These results imply that neighborhood satisfaction studies should not be content to simply measure such social constructs at larger, cruder, geographic levels of analysis, but rather should consider zeroing in on smaller contexts. Doing so may reveal greater importance of such contextual effects.

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Endnotes

[1] For example, suppose that the probability of forming a tie with a fellow resident in the micro-neighborhood is .7, but the probability is .2 of forming a tie with someone in a surrounding micro-neighborhood. Suppose also that 10 other households live in the micro-neighborhood, but 100 households live in surrounding micro-neighborhoods (as this area can be large as one can head in all directions). This person will have 7 ties in the local micro-neighborhood, but 20 ties outside it. Thus, nearly ¾ of their ties will be outside the micro-neighborhood.

[2] In ancillary models we constructed the following additional measures of the environment of the census tract: the completion rate of students in the local school district; the number of employees per 10,000 population in the tract working in: 1) bars; 2) liquor stores; 3) restaurants; or 4) recreation; the percentage of the tract that is water; the pounds of toxic waste emitted in an area, weighted by the inhalation toxicity. None of these variables showed a significant effect in our main models, and therefore were not included in the analyses.

[3] We tested for randomness of the household-level measures over micro-neighborhoods and found significant variation for the following measures: age, African-American, Latino, divorced, widowed, persons per room, perceived crime, perceived social disorder, perceived physical disorder. We thus allowed these parameters to vary randomly, though explaining this variance is outside the scope of this study.

[4] There were no estimation problems in these models. There was no evidence of collinearity among these predictors, as all variance inflation factors were below 4—a commonly specified cutoff value. Also, there was no evidence of influential cases or outliers.

[5] We also estimated additional models for each year separately. The pattern of results was extremely similar to that presented in Table 2. As an additional test, we estimated a model that included interactions between the year indicator variables and all variables in the model (a Chow test). There was no evidence of a significant improvement in model fit.

[6] This is calculated by multiplying the coefficient by the standard deviation of the predictor variable, and then dividing by the standard deviation of micro-neighborhood-level neighborhood satisfaction (since this is the outcome measure in this level two equation).

Tables and Figures

Table 1. Summary statistics for variables used in analyses

	Household		Micro-neighborhood		Tract	
Outcome measure	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**
Neighborhood satisfaction	7.818	2.179		1.228		
Predictor variables						
Average length of residence	1.895	1.154				
Proportion owners	0.573	0.483				
Residential stability			0.000	1.000	0.000	1.000
Average income	3.459	3.734	3.458	2.163	4.606	2.621
Education	12.796	2.987	12.796	1.738	0.228	0.162
African-American	0.144	0.352	0.142	0.276	0.146	0.250
Latino	0.087	0.283	0.084	0.173	0.108	0.169
Other race	0.008	0.088				
Ethnic heterogeneity			0.227	0.226	0.279	0.193
Proportion married	0.499	0.500	0.500	0.242		
Proportion divorced	0.182	0.386			0.251	0.145
Proportion widowed	0.137	0.344				
Presence of children less than 18 years old	0.340	0.474	0.585	0.506	0.469	0.100
Age	47.983	17.591	48.026	9.029	37.227	4.900
Proportion vacant units			0.082	0.151	0.077	0.066
Average persons per room	0.494	0.297	0.494	0.160	0.396	0.102
Average perception of crime	0.588	0.942	0.581	0.507		
Average perception of social disorder	0.000	1.000	0.000	0.430		
Average perception of physical disorder	0.000	1.000	0.000	0.498		

N = 25,332 household time points, 2,256 micro-neighborhood time points.

Table 2. Determinants of neighborhood satisfaction, including micro-neighborhood-level and tract-level measures of neighborhood composition. American Housing Survey special neighborhood sub-sample, 1985, 1989, 1993

	Just micro-neighborhood		Just tract		Micro-neighborhood and tract		Adding commonly perceived crime and disorder	
	(1)		(2)		(3)		(4)	
	Micro-neighborhood		Tract		Micro-neighborhood	Tract	Micro-neighborhood	Tract
Neighborhood measures								
Residential stability	0.098	**	0.000		0.112 **	-0.062 *	0.116 **	-0.061 *
	(3.08)		(0.00)		(3.12)	-(2.30)	(3.28)	-(2.32)
Average income	0.061	**	0.005		0.036 *	0.014	0.035 *	0.014
	(5.40)		(0.40)		(2.22)	(1.03)	(2.15)	(1.03)
Education	0.127	**	0.008	**	0.073 **	0.004 †	0.076 **	0.005 *
	(8.37)		(4.38)		(4.11)	(1.95)	(4.35)	(2.08)
Percent African-American	-0.507	**	0.213		-0.256	0.002	-0.268	0.002
	-(4.65)		(1.26)		-(1.34)	(1.04)	-(1.41)	(1.03)
Percent Latino	-0.292	*	-0.223		-0.021	-0.001	-0.065	0.000
	-(2.02)		-(1.17)		-(0.10)	-(0.20)	-(0.30)	-(0.06)
Ethnic heterogeneity	-0.235	*	-0.271	*	-0.131	-0.229	-0.107	-0.156
	-(2.51)		-(2.25)		-(1.09)	-(1.51)	-(0.89)	-(1.03)
Proportion married (micro-neighborhood), Proportion divorced (tract)	0.395	**	-1.689	**	0.422 **	-0.949 **	0.364 **	-0.680 *
	(3.61)		-(5.60)		(3.49)	-(3.11)	(3.08)	-(2.21)
Proportion with children, 0-18 years old	-0.198	**	-1.556	**	-0.134 *	-1.543 **	-0.115 *	-0.015 **
	-(3.87)		-(3.16)		-(2.43)	-(3.19)	-(2.06)	-(3.18)
Proportion vacant units	0.242	†	-0.918	**	0.192	-0.560 †	0.244	-0.470
	(1.82)		-(3.03)		(1.24)	-(1.93)	(1.57)	-(1.63)
Average persons per room	-0.450	*	-0.841	**	-0.602 **	-0.460 †	-0.569 **	-0.426 †
	-(2.36)		-(3.20)		-(2.85)	-(1.91)	-(2.68)	-(1.79)
Average age	0.016	**	-0.006		0.013 **	-0.012	0.011 **	-0.009
	(5.57)		-(0.57)		(4.20)	-(1.10)	(3.61)	-(0.89)
Commonly perceived crime							-0.189 **	
							-(3.83)	
Commonly perceived physical disorder							-0.051	
							-(1.19)	
Commonly perceived social disorder							-0.040	
							-(0.92)	

Table 2 (continued)	(1)	(2)	(3)	(4)
	Household	**Household**	**Household**	**Household**
Household measures				
Length of residence (logged)	-0.014	-0.009	-0.013	-0.014
	-(0.81)	-(0.50)	-(0.74)	-(0.80)
Household income	0.006	0.016 **	0.007 †	0.007 †
	(1.57)	(3.89)	(1.71)	(1.69)
Education	-0.030 **	-0.014 *	-0.028 **	-0.028 **
	-(5.56)	-(2.48)	-(4.48)	-(4.56)
African-American	0.191 **	0.057	0.154 *	0.161 *
	(3.15)	(0.99)	(2.32)	(2.43)
Latino	0.262 **	0.220 **	0.276 **	0.281 **
	(4.48)	(3.64)	(4.47)	(4.56)
Other race	-0.068	-0.073	-0.042	-0.041
	-(0.38)	-(0.42)	-(0.23)	-(0.22)
Married	0.039	0.109 **	0.035	0.033
	(0.96)	(2.72)	(0.84)	(0.78)
Divorced	-0.114 *	-0.083 †	-0.088 †	-0.090 †
	-(2.41)	-(1.73)	-(1.79)	-(1.82)
Widowed	0.010	0.034	0.015	0.012
	(0.18)	(0.63)	(0.28)	(0.23)
Presence of children less than 18 years old	0.006	0.037	0.020	0.018
	(0.16)	(1.05)	(0.55)	(0.49)
Owner	0.122 **	0.243 **	0.105 *	0.101 *
	(3.18)	(6.27)	(2.50)	(2.41)
Age	0.007 **	0.009 **	0.007 **	0.008 **
	(4.93)	(6.83)	(5.09)	(5.17)
Female	0.203 **	0.215 **	0.201 **	0.199 **
	(7.57)	(7.80)	(7.30)	(7.24)
Persons per room	0.032	-0.098	0.029	0.120 †
	(0.56)	-(1.63)	(0.48)	(1.81)
Perceived crime	-0.514 **	-0.512 **	-0.507 **	-0.484 **
	-(37.41)	-(32.68)	-(32.76)	-(28.50)
Perceived physical disorder	-0.442 **	-0.455 **	-0.437 **	-0.431 **
	-(32.45)	-(33.02)	-(31.33)	-(29.30)
Perceived social disorder	-0.394 **	-0.402 **	-0.391 **	-0.386 **
	-(22.55)	-(21.71)	-(21.49)	-(20.32)
Variance explained at level two	0.871	0.838	0.893	0.894
Variance explained at level one	0.246	0.233	0.236	0.235

*** p < .01(two-tail test), * p < .05 (two-tail test), † p < .05 (one-tail test). T-values in parentheses. N = 25,332 household time points, 2,256 micro-neighborhood time points. Hierarchical linear models. Indicator variables for wave of survey were included.*

Figure 1. Reported neighborhood satisfaction for residents in micro-neighborhoods with different racial/ethnic compositions, by race/ethnicity of respondent

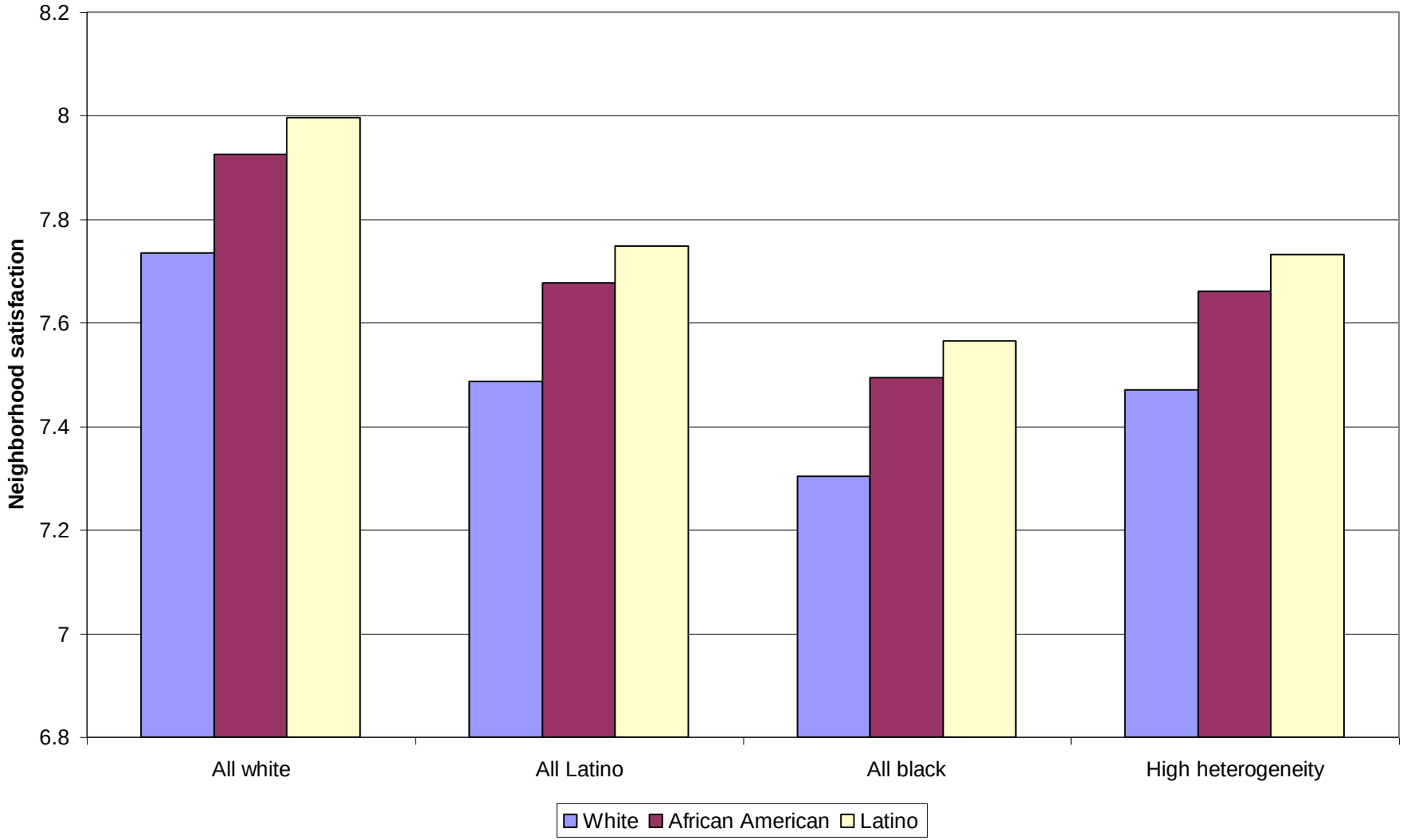

Figure 2. Reported neighborhood satisfaction for residents, testing interaction of micro-neighborhood and tract average income