Assessing Crime as a Problem: The Relationship between Residents' Perception of Crime and Official Crime Rates over 25 Years[1]

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Abstract

This study compares the relationship between official crime rates in census tracts and resident perceptions of crime. Employing a unique dataset that links household level data from the American Housing Survey metro samples over 25 years (1976-1999) with official crime rate data for census tracts in selected cities during selected years, this study finds that tract violent crime is the strongest predictor of residents' perception of crime. This standardized coefficient was .71 on average over the seven waves. Models simultaneously taking into account both violent and property crime consistently found a strong positive effect for violent crime, but a consistently negative effect for property crime. Among types of violent crime, robbery and aggravated assault have the strongest effect on the perception of crime in the tract. Burglary showed a stronger effect on perceptions of crime in the 1970s, but a steadily weakening effect since then. There was little evidence that the racial/ethnic composition of the tract affected these perceptions.

Keywords: perceived crime, official rates of crime, violent crime, neighborhoods, longitudinal, census tract, latent variables.

Bio

John R. Hipp is an Associate Professor in the departments of Criminology, Law and Society, and Sociology, at the University of California Irvine. His research interests focus on how neighborhoods change over time, how that change both affects and is affected by neighborhood crime, and the role networks and institutions play in that change. He approaches these questions using quantitative methods as well as social network analysis. He has published substantive work in such journals as *American Sociological Review*, *Criminology*, *American Journal of Public Health*, *Social Forces*, *Social Problems*, *Social Networks*, *Journal of Research in Crime and Delinquency*, *Journal of Quantitative Criminology*, *Mobilization*, *Health & Place*, *City & Community*, *Crime & Delinquency*, *Urban Studies* and *Journal of Urban Affairs*. He has published methodological work in such journals as *Sociological Methodology*, *Psychological Methods*, and *Structural Equation Modeling*.

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1. Introduction

What causes residents to perceive more crime in the neighborhood, and to what extent is this caused by the actual level of crime in the neighborhood? This is a surprisingly simple question which has important implications. Studies of neighborhoods have shown the importance of residents' willingness to get involved in the neighborhood to address problems as they arise, what Sampson and colleagues (Sampson and Raudenbush 1999; Sampson, Raudenbush, and Earls 1997) refer to as collective efficacy. Nonetheless, sometimes overlooked is an essential antecedent: residents must first *perceive* that crime exists as a problem in the neighborhood before they can undertake any activity in response to this perception. A body of literature has focused on determining the household characteristics associated with perceiving more crime among neighborhood residents (Hipp 2010a; LaGrange and Ferraro 1989; LaGrange, Ferraro, and Supancic 1992; Robinson, Lawton, Taylor, and Perkins 2003; Rountree and Land 1996a; Wilcox, Quisenberry, and Jones 2003). Another body of scholarship has asked which types of residents in a neighborhood report a greater fear of crime (Chiricos, Hogan, and Gertz 1997; Chiricos, Padgett, and Gertz 2000; LaGrange and Ferraro 1989; LaGrange, Ferraro, and Supancic 1992; Rountree and Land 1996a; Rountree and Land 1996b). It should be emphasized that these studies are generally more interested in explaining *differences* among the residents within a neighborhood rather than focusing on the extent to which these residents are *similar* in their perceptions.

The question posed here moves away from the individual-level focus of much prior research and focuses on an aggregate question: to what extent is the *overall perception of crime* of residents in a neighborhood related to the actual level of crime (Quillian and Pager 2001; Rountree and Land 1996a; Sampson, Raudenbush, and Earls 1997)? The strategy used to assess this is the same as the ecometrics technique pioneered by Sampson and colleagues (Raudenbush and Sampson 1999;

Sampson and Raudenbush 1999; Sampson, Raudenbush, and Earls 1997). The ecometrics approach combines the responses of multiple respondents from each neighborhood to compute an estimate of the neighborhood-level construct of interest. Similarly, we distinguish between an individual's perception of crime as a problem in the neighborhood and the neighborhood residents' overall perception of crime as a problem. Here, we focus on the question of the extent to which this perception of crime is actually related to the level of crime in the neighborhood (as measured by the official crime rates). To what extent are residents in fact responding to external conditions when they jointly form an overall perception of crime? Given that studies rarely conceptualize this as an aggregate-level construct, we have little evidence of the effect of neighborhood crime on this perception. As we describe below, studies have not explicitly estimated the size of this effect, in part due to a simple focus on statistical significance, and in part due to various modeling decisions. The important question then is to what extent do residents actually perceive that crime in the neighborhood is a problem when there are indeed higher levels of crime?

The existing literature also leaves relatively unaddressed whether certain types of crime are more important for fostering this collective sense of crime as a problem. Zimring (1997) argued that violent crime is most fear-inducing, which implies that neighborhoods with more violent crime should induce a greater perception of crime among residents. On the other hand, Skogan (1981) argued that property crime events will have a stronger overall effect on perceptions of crime given their relatively greater frequency. Nonetheless, the empirical evidence addressing this issue is quite limited.

The present study addresses these questions by testing the relationship between residents' common perception of crime and official crime rates in census tracts. Employing a unique dataset in which household level information from samples over a period of 25 years (1976-1999) is linked with official crime rate data for census tracts in selected cities during selected years, the degree of agreement between official crime rates in census tracts (based on official reports to the police) and

the perception of crime as a problem for a sample of residents in the tract is tested. Given that the samples change over years, as well as the variability in crime data for cities over different years, we are not attempting to test longitudinal effects; instead, this study focuses on providing more information on this relationship than studies focusing on residents of a single city at a single point in time.

2. Background

2.1 Individual differences in perceptions of crime

We have little evidence regarding the relationship between official rates of crime and neighborhood-level perceptions of crime in part because prior research has focused more closely on the differences between *individuals* in their perceptions. Much of this work comes from the fear of crime paradigm. For understandable reasons, much scholarship has asked about the determinants of the emotional response of individual-level fear (Rountree and Land 1996b). Thus, two persons in an identical environment can experience differing levels of fear. This research has focused on the question of which personal characteristics explain why some residents are more fearful (Chiricos, Hogan, and Gertz 1997; Chiricos, Padgett, and Gertz 2000; LaGrange and Ferraro 1989; LaGrange, Ferraro, and Supancic 1992; Rountree and Land 1996a; Rountree and Land 1996b). However, the focus on this visceral emotion of fear is arguably quite distinct from a simple perception of the amount of crime in the neighborhood (Rountree and Land 1996b).

Recent scholarship in this field has moved further back the causal chain in specifying perceived risk as a mediator between various individual or neighborhood characteristics and a fear of crime (LaGrange and Ferraro 1989; LaGrange, Ferraro, and Supancic 1992; Robinson, Lawton, Taylor, and Perkins 2003; Rountree and Land 1996a; Wilcox, Quisenberry, and Jones 2003). That is, residents arguably need to perceive that they are at risk of having violence inflicted upon them in order to report a visceral fear of crime. Of course, this need not be a monotonic relationship, as some residents may perceive that they are relatively at risk of experiencing violence but not report

the emotional response of fear. Note that this still focuses on the individual's perception of threat simply to *themselves*.

Additionally, we can move one step further back in the causal chain and ask about the role of a general perception of crime as a problem leading to an individual's perceived risk, which further leads to the emotional response of fear. This allows the resident to take into account the possibility that there may be a risk of violence to others in the neighborhood without a perceived risk to themselves. This suggests that these constructs are different, and therefore some individuals may perceive a relatively high prevalence of crime and consider it a problem, but not personally feel unsafe. Additionally, some individuals may report a high prevalence of crime and a perception of feeling unsafe, but not report feeling the more emotion-laden perception of fear. For instance, a relatively healthy young male may perceive little individual risk and hence fear, but be aware that older or weaker residents may be at more risk. This can change their assessment of possible neighborhood crime without a concern for their own safety. Thus, it is important to highlight that the present study focuses on the perception of crime in the neighborhood rather than individuals' own perception of risk or fear. We also move beyond the focus on households, and conceptualize this as a neighborhood-level process, as described in the next section.

2.2 Relationship between neighborhood crime and perceptions of crime

We emphasize that the present study's research question is addressed at an aggregate level, and not the individual-level. The focus here is whether the overall perception of crime in the neighborhood by a number of residents is related to the official rate of crime, rather than asking whether some individuals in a neighborhood perceive more crime than others, or why (Austin, Furr, and Spine 2002; Hipp 2010a; LaGrange and Ferraro 1989; LaGrange, Ferraro, and Supancic 1992; Quillian and Pager 2001; Ross and Jang 2000). Therefore, the body of literature suggesting that certain types of individuals will perceive more risk or fear of crime, while enlightening, is less salient in this context.

Resident perceptions of crime

Although it is certainly the case that the relationship between any individual's perception of crime and the actual amount of crime will be impacted by individual idiosyncrasies, we argue that such individual effects are counteracted by surveying several residents in the neighborhood. This distinction between individual households' perceptions of crime in the neighborhood and a neighborhood-level measure of crime perceptions is analogous to the ecometrics approach pioneered by Sampson and Raudenbush (1999) measuring various neighborhood-level constructs based on the responses of residents. As they point out, the reliability of any individual resident's assessment of the neighborhood will be much lower than the aggregated reliability of the responses of several residents (Sampson and Raudenbush 1999; Sampson, Raudenbush, and Earls 1997). These neighborhood-level estimates may be sharpened even further by also taking into account certain characteristics of residents that might bias their reports (Sampson and Raudenbush 2004; Sampson, Raudenbush, and Earls 1997). That is, although asking a single resident to assess the characteristics of the neighborhood clearly captures something closer to a *perception* of crime (Austin, Furr, and Spine 2002; Geis and Ross 1998; Hartnagel 1979; Ross and Mirowsky 2001), combining the reports of several respondents in the neighborhood may provide a more accurate portrayal. Nonetheless, only limited empirical evidence exists regarding these conjectures.

Paralleling an earlier period in which it was fashionable to critique the use of official crime data as a measure of crime, the plethora of studies showing systematic differences in perception of neighborhood crime between certain types of persons (Austin and Baba 1990; Rountree and Land 1996b; Sampson, Raudenbush, and Earls 1997; Wilcox, Quisenberry, and Jones 2003) might lead some to make the conceptual leap that surveying residents about their perception of the level of crime and disorder in the neighborhood is measuring something more akin to "perceptions" and has less to do with any "true" level of neighborhood crime. Note that to be problematic, this requires that *all* residents in a neighborhood are similarly biased.

Resident perceptions of crime

Scholars have suggested several possible reasons why resident perceptions of crime might be biased. First, social networks may play a role if residents learn about some crime events through communication with neighbors (Warner and Rountree 1997). Second, media reports may influence some residents' perception of crime as a problem (Chiricos, Padgett, and Gertz 2000; Eschholz, Chiricos, and Gertz 2003; Liska and Baccaglini 1990). Of course, given that we are dealing here with aggregated perceptions, it is unclear which neighborhoods would collectively contain more residents who are systematically biased towards being influenced by the media. Third, residents might employ such heuristics as the presence of disorder to infer more crime (Hipp 2007a; LaGrange, Ferraro, and Supancic 1992; Markowitz, Bellair, Liska, and Liu 2001; Sampson and Groves 1989; Sampson and Raudenbush 1999; Sampson, Raudenbush, and Earls 1997); note that this would not bias estimates if it is actually a valid indicator of crime. Likewise, some residents might use the heuristic of the presence of racial/ethnic minorities to infer higher levels of crime in the neighborhood than actually exists (Quillian and Pager 2001), though there is mixed evidence for this effect (Chiricos, Hogan, and Gertz 1997; Rountree 1998), and other studies suggest that racial/ethnic mixing increases the actual level of crime (Hipp 2007b; Roncek and Maier 1991; Sampson and Groves 1989; Warner and Rountree 1997), questioning whether this is indeed a biasing effect.

Given all these considerations, one extreme position would be that residents are so distracted by other features of the environment that their perception is not at all related to the actual level of crime. Although there are certainly differences between residents in their perceptions of crime, studies rarely focus on the extent to which these individual differences affect the neighborhood's overall perception of crime. This changes the question to whether there are idiosyncrasies about certain neighborhoods that lead most or all of their residents to inaccurately perceive the amount of crime.

Resident perceptions of crime

Although residents may indeed employ heuristics, such as using neighborhood disorder as a cue when assessing the amount of crime, there is little reason to suspect that residents completely discount first- or second-hand information they have regarding actual crime events in the neighborhood (through their own victimization, or through the events reported by fellow residents). If it is the case that residents combine a heuristics-based approach in which they use signs of disorder as visual cues for other possible crime events along with their own personal information, their estimates of crime in the neighborhood may be reasonably accurate. Then combining assessments of several residents in the neighborhood may well result in an overall perception that largely reflects the external conditions. Indeed, Sampson and Raudenbush adopted such an approach, and concluded that combining the responses of several respondents in each neighborhood resulted in aggregate level measures of social and physical disorder with desirable reliability properties (Raudenbush and Sampson 1999; Sampson and Raudenbush 1999; Sampson, Raudenbush, and Earls 1997). Nonetheless, we have limited empirical evidence regarding this question for crime.

2.3 Empirical evidence of crime and common perception of crime

Assessing the extent to which the common perception of crime is associated with neighborhood crime is difficult given that we lack a gold standard measure of crime. One approach uses official crime rates reported by the police as a proxy for the actual level of crime, and then assesses the extent to which perceptions are related to official crime rates. Of course, official crime reports are certainly not entirely accurate. It is well-known that not all crime events are reported to the police. For instance, the 2005 National Crime Victimization Survey reported that only 62 percent of aggravated assaults, 60 percent of robberies, and 56 percent of burglaries were reported to the police (Klaus and Maston 2006). If such reporting is systematically related to the characteristics of the neighborhood, this will likely reduce the relationship between residents' perceptions of crime and the official crime rates. On the other hand, to the extent that this non-

reporting is random across neighborhoods, this will induce no particular measurement issues for studies (Baumer 2002).

Assuming that official crime rates are a reasonable proxy for the actual level of crime, what is the empirical relationship between official rates of crime and neighborhood-level perceptions of crime? Few studies have focused explicitly on this question. Furthermore, the studies that have looked at this question rarely look at the strength of this relationship. That is, if we know the level of crime in a neighborhood, how much information does that provide us regarding residents' perception of crime? One simple measure of the strength of this relationship would be the correlation between these two measures. Studies that only assess the statistical significance of the relationship do not address this question: such a finding could be consistent with a scenario in which knowing the amount of neighborhood crime gives us just 5% accuracy in assessing residents' perception of crime, or it could be consistent with a scenario in which we have 75% accuracy in assessing this. In the former case, knowing residents' perception of the amount of crime gives us little information on the actual amount of crime, whereas the latter case provides quite a bit of information. Furthermore, the latter case would suggest that residents are indeed responding in large part to their external conditions when forming a sense of the perception of crime, whereas the former suggests that it has little impact.

The evidence addressing this question is nonetheless sparse. A national sample in 1965 found a positive relationship between the city robbery or burglary rate and residents' perceived risk of robbery or burglary (Block and Long 1973). However, this study simply tested for a significant relationship, and did not report the strength of the relationship. Another study aggregated the average perception of crime of residents to the city level and tested whether the official crime rate had a significant effect on this measure (Liska, Sanchirico, and Reed 1988). In both of these studies, using crime statistics for the entire city is arguably too crude a geographic level to estimate this relationship given the heterogeneity in crime rates over neighborhoods within a city. A study of

neighborhoods in Baltimore therefore provided a more geographically appropriate test: the study found that residents reported greater fear of crime in "high" crime neighborhoods than those in "average" or "low" crime neighborhoods (Furstenberg 1971). The author acknowledged the crudeness of the crime measure, though he concluded that "people generally have a fairly accurate notion of the amount of crime in their neighborhoods" (Furstenberg 1971).

Some prior research using a multilevel design has tested the partial correlation between official crime rates and residents' perception of crime. For instance, two studies using data from Seattle found that the tract burglary rate increased the overall perception of crime (Rountree and Land 1996a; Rountree and Land 1996b). The partial correlation effects in these studies "controlled" for neighborhood disorder (incivilities), which conflates this bivariate question given arguments that disorder is simply another manifestation of one neighborhood process that generates crime, disorder, and perceptions (Sampson and Raudenbush 2004; Sampson, Raudenbush, and Earls 1997). A study of households nested in the neighborhoods of three cities found mixed results for the relationship between official crime rates and neighborhood perceptions (Quillian and Pager 2001). This study also included additional control measures—such as measures of social and physical disorder—that again potentially confound the relationship of interest given that such disorder is arguably endogenous to the same process. Although informative, these prior studies do not address the question we are interested in here.

2.4 What types of neighborhood crime affect perceptions of crime?

Finally, if the actual level of crime in a neighborhood affects the perception of crime, the question then is what *type* of crime is most important for fostering this perception? One theoretical perspective is that of Zimring (1997), who argued that violent crime is particularly important for creating fear and uncertainty. In this viewpoint, increasing violent crime in the neighborhood will be particularly salient for increasing perceptions of crime. For instance, the National Survey of Crime Severity found that residents rated violent crimes as much more serious than property crimes

(Wolfgang 1978). Nonetheless, little systematic evidence exists if this fear of violent crime is translated into a perception of crime in the *neighborhood* when surveying residents.

On the other hand, Skogan (1981) argued that whereas a specific violent event may be most salient for residents, the much greater frequency of property crime events makes them more salient overall for fostering a fear of crime. If this fear of crime is also related to a general perception of crime, then this implies the hypothesis that although the coefficient may be larger for the effect of a violent crime event on perception of crime than a property crime event, the magnitude of the difference in coefficient sizes will be small enough that, when accounting for the actual number of such instances, property crime will show an overall larger effect on these perceptions.

Beyond the question of whether violent or property crimes are most important for fostering a perception of crime in the neighborhood is the more nuanced question of whether certain *types* of violent crime are more important. For instance, whereas homicide has consequences of severe finality that may be particularly frightening, the relative infrequency of this type of crime compared to others, as well as the possible perception that it frequently occurs between persons who know one another, may reduce its effect on residents' perception of neighborhood crime. On the other hand, the violent crime of robbery implies both physical force as well as taking financial resources, and the fact that it often occurs in public places may lend it particular weight when residents assess the degree of crime in the neighborhood. And although the violent crime of aggravated assault does not include the taking of financial resources, the fact that it also generally occurs in public places, as well as a possible perception of greater irrationality (since it is not accompanied by taking financial resources) may give it particular weight in such assessments. Knowing which types of crime are particularly bothersome to residents is certainly useful knowledge for scholars and policy makers. Nonetheless, the paucity of studies testing these issues leaves these questions unaddressed. We turn to the description of the data next.

Resident perceptions of crime

3. Data

3.1 Individual-level data from the American Housing Survey (AHS) metropolitan samples

The American Housing Survey (AHS) conducts surveys of about 4,000 housing units from each of a large number of metropolitan areas across the U.S in various years. Every two years the AHS surveys a subset of the metropolitan areas: as a result, a particular metropolitan area is surveyed approximately every four years. Because of this variability in the actual year of the survey, we are sometimes combining metropolitan areas from slightly different years. That is, whereas the "waves" are labeled 1976, 1979, 1983, 1987, 1991, 1995, and 1999, these "waves" actually contain the data for the nearest year in which a particular metropolitan area was surveyed. For instance, whereas in the 1987 wave some of the metropolitan areas were actually surveyed that year, some of the metropolitan areas were actually surveyed in 1985. This difference in the actual year is a minor issue in general, and is particularly unproblematic since all differences are conditioned out across metropolitan areas in the analyses, as described more fully below. Thus, for the analyses using violent crime rates as a predictor of the common perception of crime, there are 39,652 households in 5,774 tracts at seven time points, an average of about 7 households per tract in each wave.

The AHS asks respondents a series of three questions regarding crime in the neighborhood (as defined by the respondent): 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. These responses were combined into a four point response where the respondent either replies "no" to all questions, replies "yes" to one, "yes" to two, or "yes" to all three. We then log-transformed this outcome given that this showed a slightly stronger relationship with the crime measures (this also helps with interpretation, as we can interpret changes in this outcome measure in terms of percent changes).

3.2 Crime data from 22 cities

This study utilizes official crime data for census tracts in 22 cities over a period of 25 years. These crime data come from various sources, and are not a random sample of cities but rather a convenience sample of cities providing crime data for any years.[1] Thus, the sample varies in the years of coverage, and the types of crime available for different cities in different years. As a consequence, any given city in any given year may not provide information on all different crime types. Table 1 presents the number of households and tracts included in each of the samples and the cities from which they come. An advantage of using census tracts is that past studies have frequently used them to proxy for neighborhoods, they contain a mean of about 4,300 residents in 2000 (with 95% of the tracts containing 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).

<<<Table 1 about here>>>

In all instances, the official crime data was matched to the closest wave of the AHS. For instance, if a city's respondents were actually surveyed in 1985, they would be included in the "1987" wave of the AHS, and the crime data from 1985 was used (actually, averaged over 1984, 85, and 86, as we describe shortly). Thus, the official crime data and the perception of crime data from the AHS are nearly always coterminous.[2]

An additional complication is that the AHS residents were placed into 1980 census tracts by using special access to the Triangle Census Research Data Center (TCRDC). As a result, it was necessary to place all of the crime data into 1980 tracts. For some of the cities in older years, the data were already in 1980 tracts, requiring no additional action. For some cities, and for more recent years of data, the crime data were in 1990 or even 2000 tracts, requiring apportioning the data into 1980 census tracts assuming a uniform distribution. As a consequence, we should expect that the later years will have additional random measurement error because of this need to place the

crime data into 1980 tracts, suggesting that the relationship between the official crime rates and the perception of crime may appear weaker in later years. This should be regarded simply as a methodological limitation, rather than an indication of a change in this relationship over time.

The key independent variables in the analysis measure the amount of officially reported crime in the tracts of the study. For each of these crime measures we calculated the number of crime events reported to the police per 100,000 population and natural log transformed these variables to reduce the skew and minimize the possibility of outliers. Whenever possible, these values are averaged over three years to minimize year-to-year fluctuations.[3] The crime types were combined into measures of *serious violent crime* (a sum of robbery, aggravated assault, homicide) and *property crime* (a sum of burglary, motor vehicle theft, and larceny).[4] Measures were also constructed of five key types of crime separately: aggravated assault, homicide, robbery, motor vehicle theft, and burglary. Testing these crime types separately provides insight into whether any particular type of crime is more important for fostering residents' perception of neighborhood crime. The summary statistics of the official crime data are shown in Table 2.

<<<Table 2 about here>>>

To show how the cities in the present study compare to cities of approximately similar population size, we provide demographic and crime rate information for decadal points at the city level in the Appendix in Table A1. The cities in our study tend to have higher rates of violent crime (on average, about one standard deviation above the mean of cities of comparable population sizes) and property crime (about 0.6 standard deviations higher). Our study cities also have more poverty, single parent households, residential stability based on average length of residence, percent African Americans, and higher unemployment (all about one standard deviation higher), and they have fewer owners and white residents (both about one standard deviation lower). These differences should be taken into account when interpreting the results; of course, prior research focusing on the

neighborhoods of a single city (e.g., Chicago) relies on the arguably stronger assumption that a single city is emblematic of the processes of all cities.

3.3 Household and individual characteristics

To account for possible bias effects in assessing perceived crime and disorder, we included several individual- and household-level demographic measures. Since there may be gender differences in perceptions of the amount of crime and disorder, a dichotomous measure coded one for females was included. SES was captured with measures of household income (logged) and years of education of the respondent. To account for racial/ethnic differences, dichotomous indicators for African-Americans, Latinos, and other race (with whites as the reference category) were constructed.[5] Also included were an indicator of whether the respondent owned their residence, a measure of the length of time in the residence, log transformed, and an indicator of whether it is the household's first year in the residence (since such residents may be less aware of neighborhood problems) (Hipp 2010a). Life course was accounted for with a measure of the age of the respondent, dichotomous indicators for marital status (married, divorced, or widowed, with single as the reference category), and indicators of whether they have children less than 6 years of age at home, 6 to 12 years of age, and 13 to 18 years of age.

4. Methodology

The models are estimated as hierarchical linear models. This follows the ecometrics approach in that the random intercept in this equation can be viewed as a measure of neighborhood perceived crime (Sampson and Raudenbush 1999). Thus, the level one equation is:

$$y_{ik} = \eta_k + X_{ik}B + \varepsilon_{ik} \quad (1)$$

where y_{ik} is the combined four-point response in the AHS regarding the perception of crime reported by the *i*-th respondent of *I* respondents in the *k*-th tract, η_k is the common perception of crime in the tract, X_{ik} is a matrix of the individual-level measures, B is a vector of their effects on perceived crime, and ε_{ik} is a disturbance term.[6] This model therefore posits that there is something

"out there" in the environment causing all respondents in the tract to perceive more crime, and the correlation between the reports of these respondents in the same tract is the estimate of this common perception of crime. Note that this approach is the same as that adopted by Sampson and Raudenbush (Sampson and Raudenbush 1999; Sampson, Raudenbush, and Earls 1997) in their ecometrics approach, in that the η captures a neighborhood-level measure. Thus, each individual in the neighborhood is providing their own perception of the level of crime, and these combine into this neighborhood-level measure.[7] We can then assess the reliability of each of these individual household reports.

Of crucial interest in this study is assessing the effect of official crime rates on residents' common perception of crime in the neighborhood. To accomplish this, the household level one equation is augmented by estimating a tract level two equation as:

$$\eta_k = \beta Z_k + \beta_{city} CITY + \varepsilon_k \quad (2)$$

where η_k represents the common perception of crime in tract *k*, Z represents the reported official rate of crime in tract *k* (using measures of various types of crime), β shows the effect of this official crime rate on overall perceived crime as a percentage change (since this is a log-log model), CITY is a series of M-1 indicator variables for the M cities in that wave of data with a vector β_{city} of effects on the perception of crime, and ε_k is a disturbance for tract *k*. Since this is not a random sample of cities, the safest strategy is to simply account for all differences across cities through this series of indicator variables. Thus, this model is testing the relationship between neighborhood residents' perception of crime in the tract with the official rate of crime in the tract *among tracts in the same city*. This approach is distinct from regressing an individual household's perception of crime on the tract-level crime rate in an OLS model.

In this model, the variance explained at level two by the various types of official crime gives a measure of the association between official crime reports and the perception of crime in the

neighborhood as reported by the sample of residents. In the multilevel framework, this variance explained can be computed as the difference in the amount of level two variance between the model of interest (the model including the official crime rate as a predictor of this perception of crime) and an initial unconditional model (a model not including the official crime rates; in this case, only the city indicator variables are included as predictors of the perception of crime), and dividing this by the level two variance in this unconditional model (Raudenbush and Bryk 2002). This demonstrates the reduction in the amount of variance at level two after including the official crime rate. This variance explained in a multilevel model is analogous to an R^2 measure (Raudenbush and Bryk 2002). If we then take the square root of this value, we obtain R, which is essentially a standardized coefficient.

We accounted for missing data through the use of multiple imputation (Rubin 1987).[8] Such an approach requires the less stringent assumption of missing at random (MAR) rather than the missing completely at random (MCAR) assumption of listwise deletion. By imputing five datasets, such an approach yields appropriate standard errors that take into account the uncertainty introduced by the nonresponse (Schafer 1997). The standard errors of the five imputations are then combined using the standard formulas to take into account the variability both within and across imputed datasets (Rubin 1987; Schafer 1997).

5. Results

5.1 Relationship between residents' perception of crime and official crime rates

To assess the relationship between the rates of official crime and residents' perception of crime in the tract, we begin by separately viewing the relationship between each type of official crime and the tract-level perception of crime.[9] In Table 3, there are three rows for each crime type model: the first row displays the unstandardized coefficient, the second row displays the t-value for this coefficient, and the third row shows the fully standardized coefficient for the particular official crime type. The first seven columns of Table 3 show the results for the seven waves (1976 through

1999), and the last column shows the average standardized and unstandardized coefficients over these seven waves of data.[10] In all of these models, we account for the individual- and household-level measures described earlier.

<<<Table 3 about here>>>

There are several important patterns that can be detected in these results. The first is that there is a general downward trajectory in the size of these coefficients over this time period, which we have suggested is likely due to the additional uncertainty during the latter time points caused by the methodological artifact of needing to apportion the crime data to 1980-era tracts to match with the households, as described in the data section. The second is that the relative magnitudes of these downward trajectories differ over crime types, suggesting some interesting changes over the period of the study. The third is that, in general, tracts in which respondents report a greater perception of crime as a problem in the neighborhood are more influenced by the level of official *violent* crime types than they are by the level of official *property* crime types. We discuss these patterns next.

It is striking to note that the magnitude of the effect of burglary rates on residents' perceptions of crime has changed over this study period. The unstandardized coefficients show that whereas a one standard deviation increase in burglary rates in 1976 increased perceptions of crime as a problem 10.6% (.149*.71=.106), the size of this effect has fallen quite steadily and dramatically over the subsequent years. By 1999, the same increase in burglary rates increased perceptions of crime as a problem just 1.5% (.021*.71=.015). In part, this fall is offset by the fact that the variability in burglary rates has increased over the study period (see Table 2). Nonetheless, accounting for this variability with the fully standardized coefficients in Table 3 shows a downward pattern over time. The standardized effect of burglary rates on residents' perceptions of crime as a problem has fallen from .87 and .69 in the 1970's, to .58 and .67 in the 1980's, to .64, .48 and .58 in the 1990's. Quite clearly, burglary is less important for fostering residents' perceptions of crime as a problem now than it was in the 1970's.

Resident perceptions of crime

Second, despite the fact that burglary shows some quite strong effects in the earliest years of our study, it appears that violent crime has the strongest effect on resident perceptions. For example, robbery rates tend to have the strongest effect on perceptions of crime as a problem: in 1976, a one standard deviation increase in the robbery rate resulted in an 8.9% increase in perceptions of crime as a problem (.06*1.48=.089). On average over these seven waves, a one standard deviation in the robbery rate results in a 6.7% increase in perceptions of crime as a problem (.045*1.48=.067). We can also assess the size of this effect by viewing the fully standardized effect: this gives us a sense of this relationship based on the degree of variability in robbery rates and the outcome measure. This standardized effect ranges from .84 to.56 over these seven waves, with an average of .68. Thus, these are quite strong effects.

The effects of aggravated assault rates on perceptions of crime are also quite strong. Although the standardized effect of aggravated assault rates on these perceptions was smaller than that of burglary rates during the 1980's (1979-87), this pattern reversed during the 1990's. Thus, in more recent years the aggravated assault rate has a stronger effect on perceptions of crime than does the burglary rate. On average over this study period, a one standard deviation increase in aggravated assault rates increases perceptions of crime as a problem 6.5% (.046*1.42=.065). The weakest effects are seen for motor vehicle theft and homicide. Motor vehicle theft and homicide have average standardized effects of .58 and .57 respectively over these seven waves of data. It is notable that whereas motor vehicle theft showed a stronger effect in the earlier years, by 1995 and 1999 homicide rates show a stronger effect on perceptions of crime than do motor vehicle theft rates.

Moving to the aggregated measures of property and violent crime, we again see that *violent* crime in the tract has a stronger effect on the perception of crime than does property crime. Whereas the aggregated property crime measure has an average standardized effect of .65 over these seven waves, the aggregated violent crime rate has a higher standardized effect over these

seven waves of .71. These standardized effects range from .57 in 1995 to .89 in 1976. Over this study period, a one standard deviation increase in the violent crime rate results in an 8.6% (.055*1.56=.086) increase in perceptions of crime as a problem, on average. Note that these effects are found on particularly large samples—ranging from 1,096 households in 110 tracts in 1976 to 14,430 households in 1,936 tracts in 1995—and over seven waves of data. Thus, these averaged values for violent crime are based on 39,652 households in 5,774 tracts over seven waves, providing considerable evidence on this relationship.[11]

It is worth highlighting that our multilevel approach allows estimating the relationship between the tract crime rate and the general perception of crime of residents in the tract. This is distinct from research questions asking about the relationship between the tract crime rate and the perceptions of crime by *individuals*. To illustrate this, we also estimated OLS models in which an individual's perception of crime as a problem is regressed on the logged violent crime rate (and the individual- and household-level control variables). The results showed that, on average over these seven waves, the standardized effect of the violent crime rate on an *individual* household's perception of crime as a problem is just .24. This contrasts with our average estimate of .71 when combining the responses of several households in the tract. Thus, the strength of this relationship is about three times larger when combining these reports by residents. This is unsurprising, and comports with prior neighborhood studies showing that, whereas any one household will provide an estimate of the neighborhood that has considerable random noise associated with it, combining the results of several households will yield an estimate with considerably improved reliability (Sampson and Raudenbush 1999).

5.2 Simultaneous effects of aggregated violent and property crime

While the analyses to this point viewed the relationship between the perception of crime and official rates of various types of crime in sequential fashion, we next directly test the relative effect of the aggregated violent and property crime measures by simultaneously including them in the

model. We see very consistent results over these waves, as aggregated violent crime always has a strong positive effect on the perception of crime, whereas aggregated property crime shows virtually no significant positive effect in these models simultaneously controlling for the violent crime rate, as seen in Table 4. In five of these six waves of data (we did not have aggregated property crime data in 1987), aggregated violent crime has a significant positive effect on perceived crime, whereas aggregated property crime never has a positive effect, and frequently has a significantly negative effect. This is an extremely robust finding over a large sample (34,646 household years and 5,152 tract years) over a long period of time (six waves over 25 years). This reinforces the notion that it is violent crime that is important for the perception of crime in the neighborhood, and not property crime (Zimring 1997).

<<<Table 4 about here>>>

5.3 Sensitivity analyses: The effect of race/ethnicity

Given that prior research has sometimes suggested that the racial/ethnic composition of the neighborhood affects residents' perception of the level of crime (Quillian and Pager 2001), we assessed this in ancillary models. Including measures of the racial/ethnic composition (measures of percentage African American, Latino, and Asian) never showed significant effects over these waves. We also estimated models including the racial/ethnic heterogeneity of the census tract.[12] This measure did not achieve statistical significance at $p < .05$ over any of the first five waves, and was only significant in the last two waves with the larger sample. The average estimated coefficient was .0008, suggesting that a one standard deviation increase in racial/ethnic heterogeneity in the tract increases the perception of crime about 1.6% (.0008*20 = .016). The effects of the official crime rates on the common perception of crime remained robust in these alternative specifications. We therefore found very little evidence that the racial/ethnic composition affects this common perception of crime in the neighborhood.

Resident perceptions of crime

We also asked whether the effect of the tract racial/ethnic composition on these perceptions varies based on the race/ethnicity of the respondent. We first assessed this by creating interactions between the race/ethnicity of the respondent and 1) the percent Latino, and 2) the percent African American. In one wave—1995—we found a positive interaction between black respondents and the percent black in the tract; thus, blacks perceived more crime than whites (the reference category) as the percent black increases in the tract. However, this interaction was insignificant in the other six waves. And the interaction between Latino respondent and percent black was insignificant over all seven waves. Furthermore, the interactions between percent Latino and either black or Latino respondent were insignificant over all seven waves. Thus, there is little evidence that the racial/ethnic composition affects these perceptions. Testing interactions with the racial/ethnic heterogeneity measure showed no significant effects when interacting this with Latino respondents; and interactions with black respondents were only significantly negative in two of seven waves (1979 and 1995). Thus, there is only very modest evidence that blacks perceive less crime than whites when living in tracts with higher levels of racial/ethnic heterogeneity.

Finally, we tested whether the relationship between official crime rates and perceptions of crime differs based on the race/ethnicity of the respondent. There was virtually no evidence for this hypothesis, as the interactions between the race/ethnicity of the respondent and the violent crime rate were insignificant in all seven waves.

6. Conclusion

This study focused on the question of the extent to which neighborhood crime affects neighborhood residents' perception of crime as a problem. There is scant prior evidence regarding this question, as studies have frequently focused on individual *differences* between residents within a neighborhood rather than *similarities* among them. Ours was a particularly robust test given its use of a large sample of households living in 22 cities over a 25-year period. We saw that tract-level crime—especially violent crime—has a strong effect on neighborhood residents' perception of

crime. A summed measure of the violent crime rate showed the strongest effect on the neighborhood residents' perception of crime as a problem, with an average standardized effect over these seven waves of .71. Our results showed that if we ask *one individual* to assess the amount of crime in the neighborhood, on average these reports will be correlated just .24 with the tract violent crime rate; on the other hand, if we combine the responses of several neighborhood residents using the ecometrics approach this correlation with the violent crime rate is three times larger (.71). Thus we can conclude that although the perceptions of individuals can be somewhat idiosyncratic, and attempting to infer the amount of crime based on the report of a single resident is unwise, it is clearly not justified to assert that combining several residents' perceptions of crime is completely unrelated to the amount of crime in the neighborhood.

We also addressed the question of which type of crime has the strongest effect on residents' perception of crime, and the results provided considerable evidence in support of Zimring's (1997) hypothesis that residents are most fearful of, and hence respond most viscerally to, violent crime events. We found consistent evidence over these seven waves that residents' perception of crime was most influenced by the official rate of *violent* crime types. Furthermore, models simultaneously including both aggregated violent and property crime *always* found a strong positive effect of violent crime on perceptions of crime over these seven waves, and simultaneously found that property crime always had a *negative* effect on perceptions of crime. Thus, there is no evidence here that property crime increases the perception of crime once taking into account the level of violent crime in the tract. This is inconsistent with Skogan's (1981) hypothesis that property crime events will increase perceptions of crime as a problem. Moreover, the findings actually suggest that for two tracts with equally high rates of violent crime, the tract with a higher rate of property crime actually induces a *lower* perception of crime than does the tract with less property crime. Why this might be is not entirely clear. Nonetheless, the robustness of this relationship in this large sample over multiple years suggests an important avenue for future research.

We also point out that of the specific types of crime studied here robbery appears to have the strongest impact on residents' perception of crime. This appears to be a particularly bothersome form of crime, along with aggravated assaults. These findings, along with the limited importance of property crimes, are generally consistent of crime severity studies (Wolfgang 1978). The one exception is that whereas homicide has a quite strong effect in crime severity research, it had a weaker effect here. This likely reflects the relative rarity of homicides, suggesting that its relative infrequency limits its impact on residents. Thus, it appears that robberies and aggravated assaults have the strongest effects on residents' formation of a perception of crime as a problem.

One pattern we detected that changed over the time period of the study was the importance of burglary rates for affecting residents' perceptions of crime as a problem. Whereas in the 1970's it appeared that residents' perceptions of crime were quite strongly affected by the tract burglary rate, this was not the case by the 1990's. It is interesting to note that it was at the beginning of the 1980s that Skogan (1981) hypothesized the importance of property crimes: it appears that this hypothesis was more valid at that time point, but less so more recently. The effect of burglary has diminished such that by the 1990's robbery and aggravated assault rates were much more important than burglary rates for explaining residents' perceptions of crime as a problem in the neighborhood. Why this change has occurred is not exactly clear. One possibility is that the large drop in burglary rates over this period (the burglary rate has halved from 1970 to 2000 for larger cities as seen in Table A1 in the Appendix) has made them less salient. Of course, robbery rates, and to a lesser extent aggravated assault rates, have also dropped over this period, so this requires a more complicated explanation. Given that we are aware of no theorizing as to why burglary rates may have become less salient over time, this clearly is an important avenue for future research.

Although this study has provided key insights into the relationship between official rates of crime and residents' perception of crime as a problem, certain limitations should be acknowledged. First, this study was limited to using a particular survey question asking about residents' perceptions

of crime in the neighborhood: a three part question about the degree to which crime is a problem. Therefore, the results are specific to this particular question. Note that alternatively, residents could have been queried about how many crime events they were aware of over the last six months for specific types of crime events (Sampson, Raudenbush, and Earls 1997), rather than the degree to which they perceive it as a problem.[13] While it is uncertain to what extent residents answer these two questions differently, we were interested here in residents' perception of crime as a problem. Second, we were limited to specific cities in certain years. While this provides an advance over studies focusing on a single city at a single point in time, future studies will need to test the extent to which these results generalize to neighborhoods in other cities at other points in time.

A third limitation is that this study compared the relationship between official crime rates and residents' perceptions of crime as a problem *when both are measured at the tract level*. Future studies will want to test this relationship at other levels of aggregation. For instance, to the extent that blocks within the same tract vary in their level of crime, aggregating both official crime rates and perceptions of crime to tracts may diminish the precision of this relationship. Although this study found a fairly large standardized effect of aggregated violent crime (about .70) on residents' perception of crime over these seven waves of data, this relationship may be even sharper if one is able to measure both at smaller units such as blocks or block groups. At the same time, this provides a cautionary note for those performing analyses on data aggregating such measures to units of analysis even larger than census tracts, as the strength of the relationship may be weaker.

The key takeaway point of this study is that residents' perception of crime as a problem is quite strongly affected by neighborhood violent crime (based on official reports to the police). The standardized effect of about .70 over this large sample of tracts over a 25-year period suggests a robust relationship. This finding occurs despite the possible methodological limitations of using a particular geographic unit of analysis, the possible different "neighborhood" definitions of residents, and the particular question employed regarding perception of crime. These findings highlight that

whereas any single respondent may provide an assessment of neighborhood crime that has considerable measurement error, the combined perceptions of several residents through an ecometrics approach is quite strongly shaped by neighborhood violent crime. Residents do not appear to simply have random *perceptions* of crime, but rather are influenced by the violence in their neighborhood when coming to a collective sense of the perception of crime as a problem.

Endnotes

[1] The following data were downloaded from the city's police websites: Berkeley, Cincinnati, Menlo Park, Sacramento, San Antonio, Seattle (1999 data), St. Petersburg, Tampa, Menlo Park. The following data were obtained directly from the police departments: Buffalo, El Cajon, Los Angeles, Milwaukee, San Diego, San Diego Sheriff, West Allis. The Chicago homicide data come from the "Homicides in Chicago, 1965-1995" study by Block and Block housed at ICPSR (Block and Block 1998). The 1999 Cleveland data come from the CANDO website (http://neocando.case.edu/cando/index.jsp). The older Cleveland and Washington, D.C. data come from the "Anticipating and Combating Community Decay and Crime in Washington, DC, and Cleveland, Ohio, 1980-1990" study housed at ICPSR (Harrell and Gouvis 1994) The Denver data were downloaded from the Piton Foundation website (http://www.piton.org/). The Indianapolis data come from the Polis Center website (http://www.savi.org). The Philadelphia data come from the Philadelphia NIS database website (http://cml.upenn.edu/crimebase/). The older Seattle data comes from the "Testing Theories of Criminality and Victimization in Seattle, 1960-1990" study from ICPSR (Miethe 1998). The St. Louis data come from the "Arrests As Communications to Criminals in St. Louis, 1970, 1972-1982" study housed at ICPSR (Kohfeld and Sprague 1992). The 1999 Washington, D.C. data come from the Neighborhood Info website (http://www.neighborhoodinfodc.org/).

[2] The rare exceptions were still very close. For instance, whereas Cleveland households were interviewed in 1979, the crime data come from 1980. Likewise, whereas Washington, D.C. households were interviewed in 1981, the crime data come from 1980. Given the strong stability in tract-level crime rates over adjacent years, these differences are likely minimal.

[3] For most waves, this meant averaging the crime data for the year of the survey and the single years before and after the survey. We also estimated models in which the official crime data was averaged over the survey year and the two previous years (for temporal reasons), and found extremely similar results.

[4] We do not include rape as a component of the violent crime measure given its well-known reporting problems.

[5] For earlier years in which there were too few Latinos to estimate a separate effect, they were collapsed into the "other race/ethnicity" category.

[6] This assumption of linearity of the 4-point Likert scale outcome was tested by estimating hierarchical ordered logit models. The results were similar to those presented here. Given that the hierarchical ordered logit model requires an estimation approach that does not always have favorable properties (Rodriguez and Goldman 1995), the fact that previous work suggests that treating a 4-point Likert scale as a linear measure will frequently produce similar results to an estimation technique treating the outcome as an ordered logit (Bollen and Barb 1981), and the fact that the coefficients in a model with the logged continuous measure have a more intuitive interpretation, we present the results of the hierarchical linear models here.

[7] This approach is the same as a confirmatory factor analysis approach in which each resident's perception of crime is an indicator of the latent variable, and the latent variable captures the common perception of crime in the neighborhood. That is, the latent variable captures what is common among these respondents, or, the correlation between their reports. There is a long literature describing the CFA approach (Bollen 1989), several studies using it to measure neighborhood constructs analogous to our approach (Bauer 2003; Bollen and Paxton 1998; Hipp 2010b; Speizer and Bollen 2000), and numerous studies showing how it is identical to the multilevel approach of Sampson and Raudenbush (Bauer 2003; Lee and Tsang 1999; Mehta and Neale 2005).

[8] We had only modest amounts of missing data. Among housing units that responded to the survey, there was less than 1% missing data for any of the variables. We used the Proc MI procedure in SAS to perform the imputations. We only included information from the current wave when imputing values (given that the household in other waves could be a different one). The imputation model included measures of the presence of: undesirable odors, abandoned buildings, litter and trash, undesirable noise, street noise, unkept roads, undesirable persons, bothersome crime, nonresidential activities, undesirable nonresidential users, streets in need of repair, streetlights in need of repair, bothersome traffic, poor city services, public transportation, satisfactory police, shopping, quality schools, and recreation activities. It included measures of satisfaction with the house and the neighborhood, home value, and square footage of unit. It also included the following demographic variables: female, age, age squared, Asian, African American, Latino, other race,

years of education, household income, length of residence, new resident in last year, married, divorced, widowed, presence of children, homeowner, persons per room. We constrained all imputed values to fall within the range of values in the original measure, and did not round values to integers given Monte Carlo simulation evidence that such an approach has poor properties (Allison 2005).

[9] We can assess the degree of agreement among residents in the same census tract regarding their perception of crime with the intra-class correlation (ICC). The average ICC over these seven waves is about .05. Thus, about 5 percent of the variance exists at the level of the census tracts. In part, this suggests that census tracts may be too large of aggregated units to capture geographic units with a homogenous amount of crime across the geographic area within a unit. We are unable to aggregate the residents to smaller units—such as block groups—to assess this possibility, leaving this an open question for future research.

[10] We computed the simple average of the coefficients over these seven waves. Alternative approaches are possible: for instance, weighted averages could be constructed based on the sample size in each wave. Since the strength of these relationships may change over time simply due to the methodological artifact of placing the new official crime data into 1980 tracts (as described in the data section), we treat the seven waves equally when constructing these averages.

[11] Although these models all included the individual- and household-level control variables, an alternative question is how closely related are residents' combined perceptions of crime as a problem to official crime rates when *not* accounting for these individual differences? This is salient because to estimate the coefficients for the household bias measures requires both the official crime rate measures and the household perception measures; but if a researcher only has the household perceptual measures these bias parameters cannot be accounted for. We therefore estimated these additional models and the results showed that the improvement in this relationship is relatively modest when accounting for these household level measures. For example, the average standardized effect over these seven waves for violent crime was .65 without the household level control variables, whereas it was .71 in our main models. Property crime had an average standardized effect of .44 in the models without the household level controls, whereas it was .66 when adding the controls. For the other crime types, the improvement in the standardized coefficients when adding the household level control variables were as follows: burglary went from .50 to .65, motor vehicle theft went from .38 to .58, robbery went from .60 to .68, aggravated assault went from .45 to .63, homicide went from .40 to .57.

[12] This measure was created as a Herfindahl index of five racial/ethnic groupings (white, black, Latino, Asian, and other race) which takes the following form:

$$H = 1 - \sum_{j=1}^{J} G_j^{\,2}$$

where G represents the proportion of the population of ethnic group *j* out of *J* ethnic groups.

[13] One risk of asking residents how many crime events they are aware of is that if neighborhood ties are relatively dense there is a strong possibility of double-counting since several different residents will potentially report particular events. That is, several respondents may be aware of—and report on—the same event due to the information flowing through the network.

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Tables and Figures

Table 1. Number of households and tracts in each sample used in the analyses

Sample	Number of households/tracts	Cities in sample
a	1,096 households in 110 tracts	St. Louis
c	2,697 households in 839 tracts	Chicago and St. Louis
d	1,990 households in 224 tracts	Seattle and St. Louis
e	1,005 households in 110 tracts	St. Louis
f	3,480 households in 414 tracts	Cleveland, Seattle and St. Louis
g	985 households in 114 tracts	Seattle
h	5,439 households in 1,143 tracts	Chicago, Cleveland, Seattle and St. Louis
i	1,952 households in 205 tracts	St. Louis and Washington D.C.
j	942 households in 99 tracts	St. Louis
k	1,010 households in 106 tracts	Washington D.C.
l	3,873 households in 1,124 tracts	Chicago, Cleveland, St. Louis, and Washington D.C.
m	2,420 households in 296 tracts	Cleveland and Washington D.C.
o	4,464 households in 1,025 tracts	Chicago, Cleveland, and Washington D.C.
p	6,373 households in 1,326 tracts	Berkeley, Cleveland, Denver, Indianapolis, Los Angeles, and Washington D.C.
q	5,782 households in 1,220 tracts	Berkeley, Cleveland, Denver, Indianapolis, and Los Angeles
r	5,015 households in 1,193 tracts	Berkeley, Cleveland, Indianapolis, Los Angeles, and Washington D.C.
s	7,520 households in 1,922 tracts	Berkeley, Chicago, Cleveland, Indianapolis, Los Angeles, and Washington D.C.
t	14,430 households in 1,936 tracts	Berkeley, Buffalo, Cleveland, Denver, Indianapolis, Los Angeles, Milwaukee, Sacramento, San Diego, Seattle, and West Allis
u	13,118 households in 1,803 tracts	Berkeley, Buffalo, Cleveland, Indianapolis, Los Angeles, Milwaukee, Sacramento, San Diego, Seattle, and West Allis
v	14,496 households in 2,535 tracts	Berkeley, Buffalo, Chicago, Cleveland, Indianapolis, Los Angeles, Milwaukee, Sacramento, San Diego, Seattle, and West Allis
w	11,391 households in 1,677 tracts	Berkeley, Buffalo, Cincinnati, El Cajon, Los Angeles, Milwaukee, San Diego, San Diego County, St. Petersburg, Tampa, Washington D.C., and West Allis
x	11,876 households in 1,866 tracts	Berkeley, Buffalo, Cincinnati, El Cajon, Los Angeles, Menlo Park, Milwaukee, Philadelphia, San Diego, San Diego County, St. Petersburg, Tampa, and West Allis
y	10,884 households in 1,525 tracts	Berkeley, Buffalo, Cincinnati, El Cajon, Los Angeles, Milwaukee, San Diego, San Diego County, St. Petersburg, Tampa, and West Allis

Note: Sample is denoted throughout the Tables by the sample letter indicated in this table.

Table 2. Summary statistics of official crime rates

	1976		1979		1983		1987		1991		1995		1999	
	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD	M	SD
Aggravated assault rate (logged)			5.75	1.08	5.77	1.52	5.99	1.22	6.55	1.33	5.97	1.70	5.80	1.65
Robbery rate (logged)	6.24	1.48	6.36	1.37	6.52	1.29	6.54	1.08	6.47	1.41	5.72	1.79	5.14	1.90
Homicide rate (logged)	1.84	1.50	1.97	1.59	1.88	1.61	1.74	1.55	2.05	1.68	1.59	1.53	1.10	1.27
Burglary rate (logged)	7.85	0.71	8.03	0.62	7.84	0.75	7.59	0.69	7.70	1.20	7.19	1.50	6.61	1.31
Motor vehicle theft rate (logged)	7.09	0.91	7.17	1.01	6.96	1.19	6.94	1.11	7.30	1.14	6.58	1.88	6.24	1.77
Violent crime rate (logged)	6.86	1.27	6.78	1.26	6.74	2.22	6.81	1.68	7.20	1.33	6.68	1.59	6.37	1.59
Property crime rate (logged)	9.02	0.83	9.17	0.86	9.25	0.85			8.66	1.14	8.39	1.41	8.02	1.29

Note: sample size varies over samples (see Table 1 for a description). M = mean, SD = standard deviation

Table 3. Outcome of common perception of crime in each year, reporting the unstandardized and standardized coefficients (R) when using various official crime types at the tract level as predictors

		1976	1979	1983	1987	1991	1995	1999	Average
Property crime types									
1 Burglary	***Coef***	0.149 **	0.129 **	0.075 **	0.075 *	0.033 **	0.030 **	0.021 **	0.073
	T-value	(4.51)	(4.55)	(2.66)	(2.54)	(4.65)	(6.26)	(4.05)	
	R	0.874 a	0.694 f	0.575 i	0.670 m	0.640 p	0.484 t	0.582 x	0.645
2 Motor vehicle theft	***Coef***	0.078 *	0.054 *	0.056 *	0.033	0.035 **	0.027 **	0.013 **	0.042
	T-value	(2.45)	(2.47)	(2.39)	(1.60)	(4.24)	(5.37)	(3.24)	
	R	0.703 a	0.583 f	0.531 i	0.567 m	0.638 r	0.454 u	0.547 x	0.575
Violent crime types									
3 Robbery	***Coef***	0.060 **	0.056 **	0.042 **	0.048 **	0.043 **	0.040 **	0.028 **	0.045
	T-value	(3.94)	(4.42)	(2.92)	(3.49)	(6.70)	(9.30)	(8.06)	
	R	0.836 a	0.687 f	0.564 i	0.698 m	0.723 r	0.585 u	0.663 x	0.679
4 Aggravated assault	***Coef***		0.089 **	0.041	0.034 **	0.047 **	0.038 **	0.028 **	0.046
	T-value		(3.90)	(1.57)	(2.84)	(7.23)	(9.48)	(7.74)	
	R		0.636 g	0.556 k	0.640 m	0.740 r	0.572 u	0.643 x	0.631
5 Homicide	***Coef***	0.041 **	0.029 **	0.011	0.017 *	0.027 **	0.041 **	0.033 **	0.028
	T-value	(2.62)	(3.30)	(1.14)	(2.46)	(4.81)	(9.10)	(7.37)	
	R	0.644 c	0.538 h	0.578 l	0.565 o	0.486 s	0.520 v	0.630 y	0.566
Aggregated crime									
6 Violent crime	***Coef***	0.074 **	0.077 **	0.051 **	0.058 **	0.044 **	0.042 **	0.035 **	0.055
	T-value	(4.20)	(4.53)	(3.18)	(3.87)	(6.79)	(10.11)	(8.46)	
	R	0.893 a	0.804 d	0.610 i	0.734 m	0.708 p	0.574 t	0.666 w	0.713
7 Property crime	***Coef***	0.078 *	0.062	0.046		0.032 **	0.028 **	0.017 **	0.044
	T-value	(2.22)	(1.27)	(1.19)		(3.98)	(5.10)	(3.31)	
	R	0.704 a	0.797 e	0.843 j		0.586 q	0.459 t	0.541 w	0.655

*** p < .01(two-tail test), * p < .05 (two-tail test), † p < .05 (one-tail test). Standard errors in parentheses.*

Note: See Table 1 for description of footnotes describing the characteristics of samples at each wave. All models include the following individual- and household-level control variables: female, age, African American, Latino, other race, years of education, logged household income, logged length of residence, indicator of first year in residence, married, divorced, widowed, presence of children less than 6 years of age at home, presence of children 6 to 12 years of age, presence of children 13 to 18 years of age, and owner.

Table 4. Including both violent crime and property crime in the models simultaneously to predict the common perception of crime

	1976	1979	1983	1991	1995	1999	Average
Outcome of perceived crime							
Violent crime in tract	0.087 **	0.103 **	0.057	0.064 **	0.070 **	0.067 **	0.075
	(0.025)	(0.033)	(0.038)	(0.010)	(0.006)	(0.007)	
Property crime	-0.037	-0.097	-0.046	-0.029 *	-0.039 **	-0.046 **	-0.049
	(0.047)	(0.064)	(0.078)	(0.013)	(0.008)	(0.008)	
Variance explained	0.813	0.849	0.918	0.521	0.372	0.517	0.665

*** p < .01(two-tail test), * p < .05 (two-tail test), † p < .05 (one-tail test). Standard errors in parentheses.*

Note: All models include the following individual- and household-level control variables: female, age, African American, Latino, other race, years of education, logged household income, logged length of residence, indicator of first year in residence, married, divorced, widowed, presence of children less than 6 years of age at home, presence of children 6 to 12 years of age, presence of children 13 to 18 years of age, and owner.

Appendix

Table A1. Descriptive statistics of cities used in analyses, compared to cities of similar population size at decadal points

	1970			1980			1990			2000		
	Sample cities	All cities of this size		Sample cities	All cities of this size		Sample cities	All cities of this size		Sample cities	All cities of this size	
	Mean	Mean	Std. Dev	Mean	Mean	Std. Dev	Mean	Mean	Std. Dev	Mean	Mean	Std. Dev
Aggravated assault rate	859.7	450.6	228.1	670.4	403.5	248.4	929.7	596.8	338.8	604.8	343.6	278.3
Robbery rate	946.7	419.3	381.5	1,055.9	503.4	385.4	938.6	457.3	339.7	428.1	172.7	178.8
Homicide rate	34.4	13.8	12.2	30.6	17.2	12.1	38.1	16.2	15.2	13.2	6.3	7.6
Burglary rate	2,572.5	1,708.0	842.9	2,848.4	2,383.9	739.3	1,926.5	1,847.7	685.4	1,177.8	832.2	504.2
Motor vehicle theft rate	1,598.6	1,050.0	717.2	817.8	826.1	609.8	1,569.6	1,167.4	617.7	1,059.1	501.6	424.9
Larceny rate	4,215.2	3,184.7	924.0	5,175.2	4,073.7	1,195.3	4,021.0	4,527.1	1,654.5	3,698.4	2,707.5	1,573.4
Violent crime rate	966.1	603.8	418.2	1,726.8	1,198.8	587.4	1,891.8	1,408.3	603.0	1,052.0	700.9	464.2
Property crime rate	8,204.2	6,610.6	1,635.5	8,855.4	8,344.8	1,728.6	7,438.0	9,157.8	1,993.2	5,694.1	5,110.3	2,113.5
Population	763,998	638,695	109,489	593,010	572,593	135,766	1,160,308	608,468	160,781	663,496	253,983	225,217
Percent black	43.4	21.1	17.2	44.5	20.7	19.2	39.2	19.3	17.9	24.4	13.6	15.6
Percent Latino	1.3	5.5	9.1	2.0	8.3	13.2	14.4	12.4	15.2	19.0	14.5	17.2
Percent white	56.2	74.7	17.6	50.5	66.2	18.6	42.6	62.6	18.7	47.1	64.7	22.2
Racial/ethnic heterogeneity	51.0	42.3	10.1	45.8	47.9	7.6	55.7	27.4	26.6	56.8	27.0	27.3
Percent immigrants	2.9	5.4	4.4	5.8	7.2	5.8	12.6	10.1	7.8	15.1	12.0	10.8
Average length of residence	9.1	7.9	1.2	10.4	8.5	1.7	10.7	9.2	1.6	10.1	9.8	1.9
Average family income	9,651	11,577	2,096	21,987	21,946	2,953	41,618	45,727	10,494	59,458	66,581	16,720
Percent occupied units	92.5	94.3	1.8	91.8	92.3	4.1	90.4	91.3	3.7	92.4	92.6	5.7
Percent owners	37.6	47.7	13.9	49.3	56.7	8.7	44.8	55.8	10.6	48.2	64.3	13.7
Percent in poverty	14.2	10.9	4.3	18.8	13.4	6.6	20.8	13.9	6.8	18.8	12.2	6.7
Percent single parent households	13.1	10.6	2.4	36.8	24.8	8.4	38.0	27.3	9.9	20.7	14.2	5.9
Unemployment rate	5.4	4.3	1.5	8.8	6.4	2.1	9.0	5.7	3.1	8.0	5.9	2.7