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Abstract

Purpose: Prior studies have largely been unable to account for how variations in inequality across larger areas might impact crime rates in neighborhoods. We examine this broader context both in terms of the spatial area surrounding neighborhoods as well as the larger, city-level context. Although social disorganization, opportunity and relative deprivation theories are typically used to explain variations in neighborhood crime, these theories make differing predictions about crime when the broader areas that neighborhoods are embedded in are taken into account.

Methods: We use data from the National Neighborhood Crime Study for 7956 neighborhoods in 79 cities. Multi-level models with spatial effects are estimated to explain the relationship between crime and city and neighborhood social and economic resources.

Results: Disadvantage in the focal neighborhood and nearby neighborhoods increase neighborhood violent crime, consistent with social disorganization theory. However, relative deprivation provides a more robust explanation for understanding variation in property crime, as the difference in disadvantage between a neighborhood and nearby neighborhoods (or the broader community) explains higher levels of property crime.

Conclusions: Criminologists need to account for the larger context of nearby neighborhoods, as well as the broader city, when understanding the effect of relative deprivation on neighborhood-level property crime rates.

It's All Relative: Concentrated disadvantage within and across neighborhoods and communities, and the consequences for Neighborhood Crime

Numerous studies have found that absolute deprivation—typically measured as concentrated disadvantage—is a robust determinant of crime rates, either measured at the level of neighborhoods (*see* Pratt and Cullen, 2006; Sampson, Morenoff, and Gannon-Rowley, 2002), or at the level of larger units such as cities or SMSAs (Balkwell, 1990; Crutchfield, Geerken, and Grove, 1982; Williams and Flewelling, 1988). Another body of research has posited that the *distribution* of economic resources—*relative deprivation*—can explain levels of crime (Blau and Blau, 1982; Carroll and Jackson, 1983; Sampson, 1985). Inequality at the neighborhood level (Hipp, 2007; Messner and Tardiff, 1986) as well as within larger geographic units (such as cities or SMSAs) (Blau and Blau, 1982; Chamlin and Cochran, 1997; Land, McCall and Cohen, 1990) is also associated with increased crime rates. A limitation of studies measuring inequality in such larger units is they are unable to account for how variations in inequality across larger areas such as *cities* might influence crime rates in *neighborhoods*. Cities with fewer financial resources are less able to assist disadvantaged neighborhoods, and this inaction might facilitate crime. This suggests that the criminogenic characteristics of neighborhoods might be augmented by the larger city context, impacting neighborhood crime.

While the larger city context is likely an important reference point for understanding crime at the neighborhood level, so too are the characteristics of the surrounding neighborhoods. Recent research has emphasized the fact that neighborhoods are spatially dependent and therefore influenced by the areas within which they are situated (Mears and Bhati, 2006). Variations in levels of economic resources in the larger areas that neighborhoods are embedded could result in more or less crime than would otherwise be expected (Mears and Bhati, 2006;

Morenoff, Sampson and Raudenbush, 2001). The potential influence of the surrounding context, then, is likely influential for neighborhood crime. Thus, both the characteristics of the surrounding neighborhoods, as well as the larger city context might *simultaneously* influence crime at the neighborhood-level. Indeed, different geographic scales—neighborhood, surrounding neighborhoods, city—are nested within one another, and each scale might have differing effects on local crime rates (Kirk and Laub, 2010). Although the relationship between economic disadvantage and neighborhood crime is well documented, the implications of disadvantage for neighborhood crime are less clear when *simultaneously* accounting for disadvantage in *both* the surrounding and broader city context, and assessing whether the neighborhood-level relationships differ based on these contexts.

The implications of the broader context on neighborhood crime vary depending on the theoretical lens applied. The social disorganization literature posits that concentrated disadvantage in the neighborhood and neighborhoods surrounded by disadvantaged neighborhoods will experience higher rates of crime. Extending the logic of social disorganization theory to a larger macro context, it may be that neighborhoods located in disadvantaged cities will also have more crime. In this case, social and familial structures have been compromised, yielding a breakdown in normative behavior. On the other hand, opportunity theories (such as routine activities or crime pattern theory)[1] focus on the fact that disadvantaged neighborhoods near low disadvantage neighborhoods provide spatial positioning that creates more opportunities and hence may foster more crime. An alternative possibility from opportunity theories is that neighborhood crime would be lower when surrounded by disadvantaged areas as the lower levels of guardianship in those nearby neighborhoods would increase target

[1] For ease of reference, we will refer to routine activities and crime pattern theory collectively as opportunity theories.

attractiveness relative to the focal neighborhood. Relative deprivation theory also argues that disadvantaged neighborhoods near low disadvantage neighborhoods can foster more crime, but the mechanism for this theory differs as this nearby inequality is posited to create a greater sense of inequity, resulting in more offenders and hence more crime in the more advantaged neighborhoods. These considerations have important implications when taking into account the crime rate of neighborhoods in relation to other neighborhoods in the city, and the city itself. That is, although social disorganization, opportunity, and relative deprivation theories are typically used to explain variations in crime across neighborhoods, these theories make differing predictions about crime when taking into account the broader areas that neighborhoods are embedded.

Using data collected from 7,956 neighborhoods in 79 cities, we seek to understand whether the context and characteristics of resource deprived neighborhoods matter with regard to crime. More specifically, we directly test how city-wide characteristics might condition crime at the neighborhood level, while simultaneously accounting for the larger spatial context. This allows us to disentangle how characteristics at various geographic aggregations (city and spatial) influence crime at the local, neighborhood level and how these different aggregations might operate relative to social disorganization, opportunity, and relative deprivation theories. We construct measures of concentrated disadvantage in the neighborhood, the surrounding neighborhoods, and the city to examine the extent that neighborhood crime rates are influenced by the spatial positioning of a neighborhood with respect to both the surrounding neighborhoods and the larger, macro context.

Theoretical and Conceptual Background

There are a number of theories positing how environmental characteristics account for variations in neighborhood crime. We focus on three primary theories to explain how the broader context within which neighborhoods are situated might explain the relationship between resource deprivation and neighborhood crime: social disorganization theory, opportunity theories, and relative deprivation theory.

Social Disorganization Theory

A key theory linking ecological characteristics to neighborhood crime is social disorganization theory, which asserts that crime is a product of neighborhood dynamics (Shaw and McKay, 1942). According to social disorganization theory, high levels of disadvantage lead to more neighborhood crime due to the weakening of conventional institutions of social control, a lack of common values among residents, and the inability to regulate behavior, particularly among youth (Shaw and McKay, 1942). Three structural characteristics—socioeconomic status, residential instability and racial/ethnic heterogeneity—typified neighborhoods that Shaw and McKay characterized as socially disorganized. The social disorganization model, then, implies that neighborhoods with higher rates of poverty will experience more crime because they will have fewer available resources (social controls) to counteract crime (Bursik, 1988; Sampson and Groves, 1989; Sampson, Raudenbush and Earls, 1997).

The social disorganization perspective posits that factors associated with concentrated disadvantage result in decreased social control within a particular neighborhood (Sampson, Morenoff, and Gannon-Rowley, 2002). Accordingly, if a neighborhood is characterized by high levels of disadvantage, and the surrounding areas are characterized by high levels of disadvantage, crime in the focal neighborhood will be greater. High levels of disadvantage (including poverty) are a magnet for criminal behavior, regardless of context because fewer

resources are in place to discourage or deter criminal activity; thus, high levels of disadvantage will always yield higher crime.

This logic may extend to the spatial context of the larger, city-level environment that a neighborhood is embedded. The larger urban context can have a significant effect on a neighborhood's quality of life (Kubrin and Weitzer, 2003). A lack of resources across a particular city would only compound the effects of poverty on crime. Neighborhoods situated within disadvantaged cities would have higher rates of crime, as critical resources bolstering social controls are absent; furthermore, crime would be higher in the most disadvantaged neighborhoods in such cities, as these resources are even more limited. For example, in wealthy cities, such as New York City, disadvantaged areas are likely islands of disadvantage that segregate poorer areas from more advantaged places. City resources are likely targeted to these areas. Conversely, in poorer cities, like Detroit, the overall economic viability of the city likely impacts disorganization rates more universally across neighborhoods. Additionally, economic problems that plague a city will impact the neighborhoods of which it is comprised. For example, deindustrialization and disinvestment increase factors such as unemployment and poverty (Bursik 1989; Stark 1987; Shihadeh and Ousey 1998), factors directly tied to social disorganization. While these macro-level changes would be felt across the neighborhoods of a city, the effects may be even more intense in neighborhoods already suffering from some degree of disadvantage.

From a social disorganization perspective then, greater levels of disadvantage in the neighborhood, nearby areas, or broader city will result in higher crime rates (both violent and property). Table 1 summarizes these relationships implied by social disorganization theory. Furthermore, the geographical clustering of disadvantage across neighborhoods will result in

higher crime (an interaction effect), and disadvantaged neighborhoods located in disadvantaged cities will have higher rates of crime, as resources in these neighborhoods will be even more limited (a cross-level interaction effect). This is because neighborhoods themselves have a differential ability to acquire services: disadvantaged neighborhoods often lack the political economy to leverage city resources (Logan and Molotch, 1987), and disorganized neighborhoods typically have weak ties to formal institutions at the city level that might provide important benefits to the neighborhood (Bursik and Grasmick, 1993).

<<<Table 1 about here>>>

Opportunity Theories

According to routine activities theory (Cohen and Felson, 1979) crime will occur when a motivated offender encounters a suitable target in the absence of a capable guardian. The intersection in time and space of these three components is most likely to occur as offenders go about their routine activities. Thus, routine activities theory posits that an offender always has an inclination to commit crime, but that actual crime events will depend on the circumstances at a point in time and space. This suggests that criminal events may be concentrated geographically relative to the presence of targets or the absence of capable guardians, regardless of whether the supply of motivated offenders is uniformly distributed across the neighborhoods of a city (Morenoff, Sampson and Raudenbush, 2001).

The spatial implications of routine activities theory are embedded in environmental criminology. Environmental criminologists focus on the relationship between place and its crime inducing or crime impeding characteristics in an attempt to understand patterns of crime (Bernasco, 2006; Bernasco and Block, 2009; Bernasco and Luykx, 2003; Brantingham and Brantingham, 1993, 2008; Brown, 1982). For example, according to crime pattern theory

(Brantingham and Brantingham, 1993, 2008), offenders become aware of their environment as they conduct their normal routine activities. The distribution of offenders, targets, and guardians varies over time and space (Brantingham and Brantingham, 1993, 2008) and offenders are most aware of criminal opportunities located in areas they are most familiar. Although an offender is likely most familiar with his or her own neighborhood, they are also likely to travel through nearby areas as part of their routine activities. This has important implications for ecological studies of crime. Offenders may routinely move through areas with greater economic resources than their own neighborhood; this may increase crime in these neighborhoods as they have a greater potential supply of targets. Offenders might also traverse neighborhoods with fewer economic resources; these neighborhoods might have reduced levels of social control and thus lower guardianship (Bursik and Grasmick 1993). Consequently, crime, particularly property crime, may increase in these neighborhoods.

The relationship between distance to crime and opportunities for crime may be heavily influenced by the availability of targets, which varies across neighborhoods. This is because offenders may be more likely to travel further to areas that have more suitable targets than their own home neighborhood. Because neighborhoods are spatially dependent, a neighborhood's crime rate is likely contingent upon whether it is located in close proximity to where offenders live (supply of motivated offenders), and the presence of criminal opportunities in a neighborhood in relation to opportunities (or the lack thereof) in the surrounding neighborhoods (Morenoff, Sampson and Raudenbush, 2001). For example, White (1932) found that the mean distance to crime for violent offenses was .83 miles, compared to 1.73 miles for property offenses. Similarly, others have found that the median distance to crime for rapes was less than .75 miles compared to a median distance of almost 3.72 miles for robberies against businesses

(Santtila, Laukkanen, Zappala, and Bosco, 2008). Barker (2000) found that the mean distance traveled for burglaries was 2.41 miles. These results correspond closely with Pyle (1976), who found that the average distance traveled for residential burglaries was between 2.48 and 2.34 miles. Taken together, this implies that violent crimes are more localized compared to property crimes, which are more dispersed (Ackerman and Rossmo, 2015; Rossmo, 2000). Neighborhoods with fewer economic resources may therefore be *less* vulnerable to property crimes because offenders are less likely to target those areas, but these same areas may be *more* vulnerable to violent crimes because violent crimes occur closer to home (Cohen and Felson, 1979; Kelly, 2000). However, the characteristics of the larger macro context, such as the city, are less important for offenders because offenders are less likely to be aware of, and therefore able to take advantage of, criminal opportunities in distant locations. Furthermore, they may be unwilling to travel great distances to commit crime.

From an opportunity theory perspective and focusing on the presence of targets, property crime will be lower in the focal neighborhood when levels of disadvantage are greater because there are fewer suitable targets; conversely, violent crime will be higher in more disadvantaged neighborhoods as they are more prone to violent crime and because offenders travel shorter distances to commit violent crime (see Table 1). Thus, the presence of more suitable targets combined with nearness to motivated offenders implies that low disadvantage neighborhoods surrounded by higher levels of disadvantage will have particularly high property crime rates (an interaction effect). This relationship will likely be weaker when examining violent crime given its more localized nature. However, if one were to focus on the presence or absence of guardians, and if disadvantaged neighborhoods have fewer guardians on average—given the evidence that they typically have lower collective efficacy (Sampson, Raudenbush and Earls, 1997)—then a

disadvantaged neighborhood will be a better target than nearby low disadvantage neighborhoods. This implies that the highest property crime will be observed in high disadvantage neighborhoods surrounded by low disadvantage neighborhoods (an interaction effect). Note that criminal opportunity theories make no predictions regarding the effect of city-level disadvantage (given that this broader context would not be salient to offenders who typically have more circumscribed awareness areas), distinguishing them from relative deprivation theory.

Relative Deprivation Theory

Relative deprivation theory, also known as reference group theory (Merton, 1968) or strain theory (Agnew, 1999), posits that perceived inequality results in criminal behavior by individuals. More specifically, relative deprivation theory contends that individuals compare themselves to their "reference group" and, if they feel deprived of their equitable share of resources may experience stress or frustration, causing some individuals to respond by engaging in criminal behavior. This implies more offenders in an area, and holding constant the number of targets and guardians, an ecological consequence will be higher crime rates. An individual may commit property crimes as a means of re-balancing economic resources that had been inequitably distributed, or may commit a violent crime as a means of retribution.

A challenge associated with relative deprivation theory is the proper specification of a reference group. This is a particularly important challenge for ecological studies of crime, as the proper unit of analysis is crucial when measuring any *distribution* variable such as inequality (i.e., the distribution of income). An important component of the theory is that individuals will only compare themselves to those with whom they feel similar (Agnew, 1999). Thus, defining the individuals in the group who are the object of this comparison is crucial for the theory (Hipp, 2007). One possibility is that the important reference group is constrained to those living within

the same neighborhood, however defined. This method has been previously used by scholars, who have suggested that such comparisons are limited to those with whom individuals come into contact (Alwin, 1987; Crutchfield, 1989). If these assumptions are correct, then there should be a higher number of offenders in such neighborhoods, and hence a strong, positive relationship between neighborhood inequality and neighborhood crime (Hipp, 2007).

Another possibility is that individuals do not simply compare themselves to other residents within their same neighborhood, but also are aware of the conditions in the surrounding neighborhoods. According to Agnew (1999), feelings of inequality are most likely to result in crime when there is a high degree of inequality both *within* and *between* neighborhoods (p.135). Under relative deprivation theory, the perception of inequality occurs not only by an individual's assessment of his or her own neighborhood, but also from adjacent areas that are familiar. Consequently, understanding the extent that the area surrounding a neighborhood influences perceptions of deprivation is important for understanding how reference groups are defined and ultimately their effect on crime. The implication of relative deprivation theory is that high levels of disadvantage will result in lower crime if the surrounding areas have equally high levels of disadvantage. That is, if residents define their reference group as those living in nearby neighborhoods, similar economic circumstances will lead to no sense of inequality. A large cluster of neighborhoods characterized by high levels of disadvantage might experience lower levels of crime compared to neighborhood clusters with heterogeneous levels of poverty (where a sense of deprivation among residents might lead to higher crime). Conversely, neighborhoods characterized by low levels of disadvantage will experience higher rates of crime when surrounded by neighborhoods with higher levels of disadvantage. In this case, residents in the

more disadvantaged surrounding neighborhoods experience higher levels of relative deprivation and therefore commit crimes in these focal neighborhoods as a means of recalibrating resources.

Limiting a reference group to an individual's own neighborhood or the surrounding neighborhoods assumes that an individual is not affected by the characteristics of the city that his or her neighborhood is embedded, which may be untenable. The structural characteristics of a city are determined by the dispersal of characteristics such as disadvantage and unemployment, and the structural *distribution* of these characteristics across the city landscape may be consequential for levels of neighborhood crime (Sampson, 1986). Cities have their own political economy whereby resources are organized by various actors seeking to maximize their own political or economic interests (Logan and Molotch, 1987). Consequently, community resources are unevenly allocated across the city, to the detriment of neighborhoods with little political or economic significance. This partitioning of resources within cities may lead to inequality and a sense of deprivation among residents. The consequence would be a larger number of offenders, and hence a higher level of crime at the ecological level. This implies a cross-level interaction between city-level and neighborhood-level disadvantage in which highly disadvantaged neighborhoods in *low* disadvantage cities have the highest crime rates.

The relative deprivation perspective implies feelings of deprivation are lower among disadvantaged residents living in a comparatively poor city as opposed to those in a more affluent city. Residents in poor neighborhoods will not feel as disadvantaged if there is little to reference in terms of resources across the entire city, and therefore crime would be lower in such high disadvantage neighborhoods. This suggests that the macro-structural characteristics of the city may have a differential impact on neighborhood crime given similar levels of neighborhood disadvantage.

From a city-level perspective, relative deprivation suggests that feelings of deprivation will be higher when disadvantaged neighborhoods are surrounded by less disadvantaged neighborhoods (an interaction effect), or embedded in larger places (cities) where resources have been unevenly distributed (a cross-level interaction; see Table 1). Conversely, crime rates will be lower when disadvantaged neighborhoods are embedded in areas and cities with equally high levels of disadvantage. Relative deprivation theory also posits that this effect will be stronger for property crime, given that property crimes would be committed in an effort to redress inequitable socioeconomic conditions. Furthermore, if the appropriate reference group is the broader city, then high disadvantage neighborhoods in low disadvantage cities will have higher crime rates given this heightened sense of relative deprivation, which implies a cross-level interaction effect.

Prior Research Examining Neighborhood and Community Context

Prior research has rarely simultaneously accounted for the nesting of all of these different geographies of scale—neighborhoods, surrounding neighborhoods, city—in examinations of neighborhood crime. Therefore, we do not know the differential effects of ecological structure at various scales on neighborhood crime. Further, we do not know how these different contexts interact to influence neighborhood crime. Instead, extant studies examining neighborhoods and their broader context have analyzed either neighborhoods and their spatially proximate areas or their larger city-level context. Research examining the relationship between characteristics of spatially proximate areas and neighborhood crime has almost exclusively viewed this through the lens of social disorganization theory (Browning, Feinburg and Dietz, 2004; Heitgerd and Bursik, 1987; Morenoff, Sampson and Raudenbush, 2001; Peterson and Krivo, 2005; Rosenfeld, Fornango and Rengifo, 2007; Walsh and Taylor, 2007); hence, we do not know the implications of relative deprivation and opportunity theories when accounting for this broader context.

Another limitation of prior research is that studies frequently only test whether more *crime* in nearby neighborhoods increases crime in the focal neighborhood (Browning, Feinburg and Dietz, 2004; Hipp, 2007; Morenoff, Sampson and Raudenbush, 2001; Rosenfeld, Fornango and Rengifo, 2007; Walsh and Taylor, 2007). Therefore, we know from prior research that neighborhood crime, especially violent crime, is higher when neighborhoods are characterized by social disorganization and are surrounded by neighborhoods with high rates of crime. Less frequently have studies examined whether the *demographic characteristics* of nearby neighborhoods affect the level of crime in the focal neighborhood (for exceptions, see Heitgerd and Bursik, 1987; Hipp, 2010; Krivo and Peterson, 2009). Even these latter studies, however, do not account for the possibility that the socioeconomic characteristics of adjacent areas may moderate the effect of focal neighborhood disadvantage on crime. A key difference in our approach is that we posit that the characteristics of the focal and nearby neighborhoods—and both the *differences* and *similarities* in the socioeconomic characteristics of adjacent areas—are what impact local crime rates.

One notable exception is a recent study by Mears and Bhati (2006), who found that levels of resource deprivation in proximal neighborhoods had no impact on homicide rates in the focal neighborhood, but found that socially similar neighborhoods experiencing relative deprivation had higher rates of violent crime, regardless of proximity. While Mears and Bhati account for the potential moderating effects of social similarity on resource deprivation relative to neighborhood crime, they do not examine how resource deprivation might affect neighborhoods with *varying* levels of resource deprivation, nor do they account for other social/structural characteristics in surrounding neighborhoods. Thus, taking into account the characteristics of the surrounding context and whether this context may have a differential effect on neighborhood crime given

variations in internal levels of disadvantage may provide insight into different levels of neighborhood crime.

When moving to the broader city context, research has emphasized the importance of macro-structural characteristics on crime and aspects of social and economic disadvantage (LaFree, Baumer, and Obrien, 2010; Hipp, 2011; McCall, Land, Parker, 2010; Shihadeh and Ousey, 1996; Parker and McCall, 1999; Wilson, 1987). The majority of these studies have examined and found that racial segregation and inequality lead to increased crime, particularly violent crime (LaFree, Baumer, and Obrien; Hipp, 2011; McCall, Land, Parker, 2010; Shihadeh and Ousey, 1996; Wilson, 1987), while other studies have found that economic deprivation and inequality can impact race-specific homicide trends (Parker and McCall, 1999). Yet, most of these studies have examined the impact of macro-structural characteristics on crime at an aggregate level (cities or SMSAs), and therefore, the implications of macro-structural forces on a more micro-level, such as neighborhoods, has not been tested extensively. Consequently, the impact of larger city-level characteristics, particularly aspects of deprivation and disorganization, on crime rates in its constituent neighborhoods is largely unknown. These factors might be consequential for catalyzing strain amongst residents, or for understanding how disorganized neighborhoods are impacted by variations in city-level resources.

There are two particularly salient studies for our research question. First, Hipp (2011) paralleled this earlier work by employing an outcome measure of city-level crime, but measured the level of racial and economic segregation across the neighborhoods of a city to assess whether this affected the overall level of crime in the city. Of particular note is Hipp's finding that within neighborhood inequality had its greatest effect on *city* crime rates when overall levels of inequality in the *city* were low. Second, recent work by Krivo, Peterson and Kuhl (2009) and

Peterson and Krivo (2009) focused on the relationship between city racial segregation and neighborhood violent crime. Although this work by Peterson and Krivo and colleagues provides important insights, it only examines the potential moderating effects of racial segregation on neighborhood crime and does not consider several other city-level characteristics that may be important for understanding neighborhood crime, including resource deprivation.

Data and Methods

Data and Sample

The data used to examine these hypotheses come from the National Neighborhood Crime Study (NNCS), conducted by Krivo and Peterson (Krivo, Peterson, and Kuhl, 2009), and the U.S. Census. The NNCS was designed to obtain crime data for neighborhoods across several large cities throughout the country. Although crime data is available by neighborhood for some cities, this represents the first large scale endeavor to obtain crime data for a large number of cities. A sample of cities was selected from cities and incorporated places with a population of 100,000 or more in 1999. Cities were randomly selected within census regions. Data for seven of the FBI's index offenses were collected from police departments for 1999-2001 for each of the census tracts within each police jurisdiction, the operational definition of neighborhood (Krivo, Peterson, and Kuhl, 2009). In order to contextualize these neighborhoods, crime data from the NNCS neighborhoods were combined with census data from 2000.

Dependent Variables

The dependent variables for this study are violent and property crime for census tracts. *Violent crime* includes homicide (murder and manslaughter), aggravated assault, and robbery whereas *property crime* includes burglary, larceny and motor vehicle theft. Both violent and property crime are a three-year average rate per 1,000 population (1999-2001) of crimes reported to police. Averaging crime rates across three years allows for the minimization of annual

fluctuations in crime across small reporting units (in this case, census tracts). A value of 1 was added to violent and property crime and the variables were then logged to account for the skewed distribution. Fewer cities reported violent crime incidents compared to property crime. Although the complete sample has 9,593 census tracts across 91 cities, some cities had missing violent crime data and therefore we could not include them. We therefore conducted our analyses only on neighborhoods in cities that reported both violent and property crime (to allow direct comparisons),[2] for a sample of 8,267 neighborhoods in 79 cities, and when including the spatially lagged variables, this number declined to 7,956 neighborhoods in 79 cities (as a few neighborhoods had no nearby neighborhoods). Thus, this is the sample size for all models examined in this study.

Independent Variables

Independent variables were derived using U.S. Census data from 2000 to account for both neighborhood and city characteristics. As one measure of relative inequality, the *Gini coefficient* was employed, based on the following formula:

$$G = \frac{2}{\mu n^2} \sum_{i=1}^{n} i x_i - \frac{n+1}{n}$$

where x_i represents household income, μ represents the mean income value, and households are organized in ascending values by *i* up to *n* households in the sample. This was measured at the tract and the city-level.[3]

In accordance with relative deprivation and social disorganization theories, we constructed a measure of *concentrated disadvantage* by creating a factor score using principal

[2] In ancillary property crime models, we included all neighborhoods, regardless of whether violent crime was reported. The results from these models were substantively similar to the models presented.

[3] We account for the binned nature of the data by utilizing the Pareto-linear procedure, which Nielsen and Alderson (1997) adapted from the U.S. Census Bureau strategy and incorporated into their prln04.exe program (http://www.unc.edu/~nielsen/data/data.htm).

components based on five measures: 1) percent residents living below the poverty line; 2) percent unemployed; 3) percent of single parent households; 4) median income; and 5) median home value. The eigenvalue was 3.32 and the Cronbach's alpha was .87. All variables loaded onto one construct, with the first three variables loading positively and the latter two variables (median income and median home value) loading negatively.

In order to minimize spurious findings, additional control variables were included. In accordance with social disorganization theory, we account for the racial and ethnic composition of a tract or city with a measure of *racial/ethnic heterogeneity* using the Herfindahl Index (Gibbs and Martin, 1962) based on the mixing of five racial/ethnic groups (white, African-American, Latino, Asian and other races). The percentage of *occupied units*, the percentage of *African-American* residents and the percentage of *Latino* residents were all included in the analyses. As per social disorganization theory, a measure of *residential stability* was constructed by creating a factor score based on a principal components of three measures: 1) average length of residence; 2) percent in tract living in the same house for the last five years; and 3) percent of homeowners. All factors loaded positively onto one construct, with an Eigenvalue of 2.27 and a Cronbah's Alpha of .84.

A number of city-level control variables were also included in the analyses to account for important differences across cities. In accordance with opportunity theories, we included a measure of *population density* to account for increased criminal opportunities (Harries, 1974). Given that Hipp (2011) suggested that the distribution of economic resources across the neighborhoods of a city may have important implications on crime rates, we included a measure of *economic segregation*, to provide another proxy for relative deprivation. This was calculated

by taking the variance in logged median income over tracts in the city (Lobmayer and Wilkinson, 2002).[4] We also included regional measures to capture cities in the *South* and the *West*.

To account for the effect that adjacent neighborhoods may have on one another, we created spatially lagged versions of our independent variables. Prior research suggests a distance decay effect (Rengert, Piquiro and Jones, 1999). We created a weight matrix (*W*), with a linear inverse distance decay capped at 5 miles, which was then row-standardized.[5] The independent variables were then multiplied by this *W* matrix to create spatially lagged versions of these measures as the average of nearby neighborhoods to a focal neighborhood weighted by the *W* matrix.[6] We also computed a *W* matrix based on a biweight kernel decay function and computed spatially lagged variables; the correlation for the disadvantage variables were .993 between the two approaches, suggesting that the choice of decay function is likely not critical.

Finally, in order to test for the potential moderating effects of both city-level constructs and the spatial influence of adjacent neighborhoods on focal neighborhoods, by incorporating a series of interactions, we can decipher how disadvantage at the neighborhood level and disadvantage in the broader areas (surrounding neighborhoods, city) work in concert to influence neighborhood crime. Interactions were created between the spatially lagged and tract measures. We tested cross-level interactions between the tract and city-level measures, and a three-way cross-level interaction between the tract and spatial lags with the city-level measure. The

[4] For this measure, we first logged the median income of each tract in the city. We then computed the variance of these values within a city.

[5] We included a 5 mile distance decay due to the spatial isolation of some of our neighborhoods. When a 2 mile distance decay was estimated, this reduced our sample to 7,570 neighborhoods in 78 cities. In an effort to retain as many neighborhoods and cities as possible, we employed the 5 mile distance decay function. Ancillary models using a 2 mile distance were estimated and results were substantively the same as when a 5 mile distance was used.

[6] There is a strong spatial pattern of crime events; however, this spatial pattern effectively is explained by our models. Using a distance band of 1 1/3 miles, we find that the average spatial autocorrelation value over cities was .34 with an average p-value of .06 for violent crime, but just .09 with an average p-value of .142 for the residuals. Most of the cities did not have significant spatial autocorrelation of the residuals. For the property crime rate, the average spatial autocorrelation value over cities was .15 with an average p-value of .105, but the value for the residuals was just .073 with an average p-value of .16. Again, most cities did not have significant spatial autocorrelation of the residuals.

interactions between the tract measures and the surrounding neighborhoods, as well as the cross-level interactions between the tract and city level measures enables us to determine the extent to which the broader context within which a neighborhood is embedded conditions the relationship between disadvantage and crime at the neighborhood level. This provides a more direct test of relative deprivation theory, since the influence of the broader economic context on neighborhood crime is in direct relation to that of the neighborhood itself. Table 2 provides the summary statistics for the variables used in the analyses.

<<<Table 2 about here>>>

Methodology

The primary outcome variables in the analyses were property and violent crime rates in neighborhoods. In order to understand the mutual effects of city and neighborhood factors, multi-level modeling was used. This allowed for the estimation of both neighborhood and city effects simultaneously. In order to reduce the potential effects of multicollinearity, all variables were grand mean centered. In addition, variance inflation factors (VIF) were estimated after each model to ensure collinearity was not present in the models. [7]

We estimated a mixed effects model with a random intercept that allowed us to examine whether variation in neighborhood crime can be explained by spatial or city characteristics, above and beyond the characteristics of the focal neighborhood. This implies the following equation:

$$Y_{ij} = \beta_{0j} + \rho WX_{ij} + \Gamma_1 X_{ij} + \varepsilon_{ij} \qquad (1.1)$$

[7] Spatially lagged versions of percent African American and percent Latino were created, but when included in the model, resulted in multicollinearity. Consequently, these variables were dropped from the analysis. No other problems were detected in the models. The highest VIF score was 7.30 for our city disadvantage measure, well below the .10 tolerance recommendation (Kennedy, 2003). We also estimated ancillary models without the variables with the highest VIF value, and the results were substantively similar, suggesting no problems.

where Y_{ij} is neighborhood crime for *i* cases in *j* cities, β_{0j} represents the random intercept across cities, ρ represents a vector of the spatial parameters, *WX* represents spatially lagged versions of the neighborhood measures, X_{ij} represents the vector of neighborhood level characteristics for *i* cases in *j* groups, with a Γ_1 vector of effects on neighborhood crime, and ε_{ij} represents the error term. (We estimated initial models without the spatially lagged measures or the city-level measures to assess the importance of accounting for nearby neighborhoods). At the city-level the random intercept, β_{0j} implies the following equation:

$$\beta_{0j} = \gamma_{00} + \Gamma_2 X_j + \mu_{oj} \qquad (1.2)$$

where γ_{00} represents the mean value of crime across cities, X_j represents the vector of city-level characteristics for *j* groups, with a Γ_2 vector of effects on neighborhood crime, and μ_{oj} represents the error term. We treated these crime rate outcomes as continuous measures given that they closely approximated a normal distribution.

To improve model specification, we also tested whether our neighborhood level measures and the spatially lagged versions of our neighborhood measures (level 1) were random across cities (level 2). This implies the following equations:

$$\Gamma_1 = \gamma_{10} + \mu_{1j}$$

$$\rho = \gamma_{20} + \mu_{2j} \qquad (1.3)$$

where γ_{10} and γ_{20} represent the mean regression slopes across cities, and μ_{1j} and μ_{2j} represent the unique increments to the slope associated with each city *j*.[8]

In order to examine the potential moderating effects of both adjacent neighborhoods and city-level characteristics on neighborhood crime, our final set of models tested interactions between our neighborhood measures and the spatially lagged measures, as well as the cross-level

[8] We tested all level-1 variables as random coefficients but only our measures of tract and spatially lagged concentrated disadvantage were significant.

interactions between our neighborhood measures and the city-level characteristics. Thus, WX_{ij}* X_{ij} represents a matrix of interactions between the spatially lagged variables for concentrated disadvantage (WX_{ij}) and the neighborhood variables (X_{ij}) for concentrated disadvantage and is added to equation 1.1. To test cross-level interactions between tracts and cities, a set of particular X_j variables are added to the first equation in 1.3 for particular X_{ij} variables. For example, including the city-level disadvantage variable to the right hand side of the equation in 1.3 for the random effect for tract disadvantage provides this cross-level interaction (writing the reduced form version of equation 1.1 would include $X_{ij}X_j$).[9]

Results

To explore the relationship between relative deprivation and crime rates, we first focus on inequality *within the tract*. In these initial models, we ignore potential spatial or city effects. We find that for both property and violent crime, our neighborhood measure of relative deprivation (the Gini coefficient) is positive and significant, and this coefficient is robust across all models, even controlling for all of the other measures in the model, including concentrated disadvantage. This is in the expected direction. Thus, in model 1 in Table 3, when we examine the models accounting only for neighborhood characteristics we find that a neighborhood with one standard deviation greater Gini value has 14.9 percent more violent crime.[10] In model 1 in Table 4, a similar greater Gini values is associated with 13.6 percent more property crime. In these same models, we find that absolute deprivation (measured as concentrated disadvantage) is positively related to violent crime: neighborhoods with one standard deviation more concentrated disadvantage have 37.6 percent more violent crime and 21 percent more property crime.

[9] To examine the improvement in overall model fit, we calculated the difference between the variance explained by our model with no predictors, and our full model and found that for violent crime, the difference in the variance explained was 54 percent; for property crime, the difference in the variance explained was 41 percent.

[10] The standard deviation change was calculated by taking the estimated coefficient for relative deprivation and multiplying it by the standard deviation of relative deprivation (.0229 * 6.799)*100 =14.95. Given that our crime variables are logged, we can interpret this value as an elasticity (a percentage change in crime).

<<<Tables 3 and 4 about here>>>

In model 2 in Table 3 we account for disadvantage in nearby neighborhoods and find that whereas neighborhoods with more concentrated disadvantage have higher violent crime rates (β=.298), greater concentrated disadvantage in the surrounding neighborhoods is also associated with higher violent crime rates (β=.260). This relationship is detected while also controlling for all of the neighborhood-level measures in the model as well as those in the surrounding neighborhoods. As per social disorganization theory, concentrated disadvantage in nearby areas has a reinforcing effect on violent crime in the focal neighborhood. This implies that geographically clustered disadvantage has strong consequences for violent crime rates.

The story is somewhat different for property crime. In model 2 in Table 4, we find that the magnitude of the coefficient for neighborhood concentrated disadvantage, while still significant, is reduced by almost half to β=.133, controlling for the other spatial and neighborhood-level indicators in the model. Instead, it is concentrated disadvantage in the *surrounding* neighborhoods that plays a more important role in increasing property crime rates (β=.254), as the magnitude of this coefficient is nearly double that of disadvantage in the focal neighborhood. The positive coefficient of the spatially lagged measure of concentrated disadvantage is consistent with social disorganization and opportunity theories.

Model 3 examines the relationship between city-level inequality or disadvantage and neighborhood crime, net of neighborhood and spatial characteristics. The Gini coefficient at the city-level was not significant in any of our violent or property crime models. Our macro-level measure of disadvantage is related to both violent and property crime (model 3 in Tables 3 and 4). Note that this must be interpreted simultaneously with the neighborhood-level measure of disadvantage; this is because a one percent increase in city disadvantage necessarily implies that

the neighborhoods all equally experience a one percent increase as well. Note that if neighborhoods were to experience differential disadvantage change in such an instance, the level of inequality would change (in violation of the assumption of holding all measures constant in interpretation). A one standard deviation increase in city-level concentrated disadvantage is associated with 15 percent more violent crime in the neighborhoods of the city (the 15.8 percent decrease for the negative city-level coefficient is combined with the 30.8 percent increase for the neighborhood level coefficient).[11] For property crime, the city-level concentrated disadvantage effect actually overpowers the neighborhood-level effect; thus, a one standard deviation increase in city disadvantage results in 2.9 percent less property crime in the neighborhoods.

We detected no significant effects in model 4 for the interaction between neighborhood concentrated disadvantage and disadvantage in the surrounding neighborhoods with regard to violent crime. However, we find that the relationship of neighborhood concentrated disadvantage with property crime is tempered when such neighborhoods are surrounded by neighborhoods with higher levels of concentrated disadvantage. We visually display the results of model 4 in Table 4 by plotting property crime rates for neighborhood concentrated disadvantage at high (1 standard deviation above the mean), average (mean), and low (1 standard deviation below the mean) levels. Neighborhoods with the highest property crime rates are those surrounded by neighborhoods with high levels of concentrated disadvantage, regardless of the level of disadvantage in the neighborhood itself (the top line in the figure). With less disadvantage in nearby areas, property crime is lower in the focal neighborhood; however, this relationship is most pronounced when the focal neighborhood is surrounded by neighborhoods with the *lowest* levels of disadvantage (the lower left hand side of Figure 1). This is consistent with relative

[11] Technically, they should all increase the same percentage, though this complication only modestly affects the interpretation.

deprivation and opportunity theories, as a low disadvantage neighborhood surrounded by high disadvantage neighborhoods has relatively high property crime (top left point in the figure). Again, these models control for the other neighborhood, spatial and city-level measures.

<<<Figure 1 about here>>>

We also detect a significant moderating relationship for both property and violent crime for our cross-level interaction between city and neighborhood concentrated disadvantage (model 4 in Tables 3 and 4). In the property crime model (model 4 in Table 4), although disadvantaged neighborhoods have more property crime, this relationship is most pronounced in cities with the *lowest* levels of disadvantage (the right side of Figure 2).[12] Conversely, neighborhoods with low levels of disadvantage experience relatively comparable levels of property crime as levels of disadvantage across the city fluctuate (the left side of the graph). This differs from the pattern in figure 1, and implies that seemingly better off neighborhoods compared to other residents in the city will experience similar rates of crime compared to those living in more disadvantaged neighborhoods. As a consequence, whereas a high disadvantage neighborhood has 14.6 percent more property crime than a low disadvantage neighborhood when both are in high disadvantage cities, this gap is 35 percent when both are in low disadvantage cities. Thus, the gap is 20.4 percent wider in a low disadvantage city for property crime, and 17.3 percent for violent crime (not shown).

<<<Figure 2 about here>>>

We next examined how the larger macro context might influence the relationship between cities and neighborhoods with various levels of concentrated disadvantage. To test these relationships, we examine the results of a three way interaction between neighborhood, spatially

[12] Given that changing the level of disadvantage in the city necessarily implies a change in the level of disadvantage in the neighborhoods across the city, we have accounted for that in the figure.

lagged, and city-level concentrated disadvantage. We detected significant results for the violent crime model only (model 5 in Table 3). When we plot these results in Figure 3, it is striking that the highest violent crime rates occur in high disadvantage neighborhoods surrounded by high levels of disadvantage but in *low* disadvantage cities (the left-most bar in Figure 3). These disadvantaged neighborhoods are clustered together and segregated within a larger city context that is less disadvantaged, and it is notable that they have much lower levels of violent crime when they are located in high disadvantage cities (the left bar among the cluster on the right side of this figure). We also see that for all the other combinations of disadvantage in the neighborhood and surrounding area that the violent crime rate is higher in a low disadvantage city; nonetheless, the difference is largest for these neighborhoods of clustered disadvantage located in a low disadvantage city. No such interaction effects were observed for property crime.

<<<Figure 3 about here>>>

We also assessed whether the level of economic segregation in the city similarly moderated the relationship between geographically clustered disadvantage and crime rates (Model 6 in Tables 3 and 4). There was little evidence for this relationship. The interaction coefficient was nonsignificant in the property crime model, and the significant interaction coefficient in the violent crime model yielded a substantively small relationship when plotted (not shown). Thus, it is the level of concentrated disadvantage in the city, and not the level of economic segregation, that moderates these patterns of clustered disadvantage.

We briefly discuss the results of our control variables. The pattern for residential stability differs across our property and violent crime models. Although greater residential stability in the tract is associated with lower property crime rates, residential stability in the surrounding neighborhoods or the city showed no such relationship. Conversely, we see that neighborhood

residential stability only approaches significance in our violent crime models; instead it is residential stability in the surrounding neighborhoods that has a negative relationship. We found that neighborhoods with higher percentages of African American residents have higher levels of violent crime but lower levels of property crime, controlling for other factors in the model. Neighborhoods with greater percentages of Latinos have lower levels of both property and violent crime. Whereas neighborhoods with higher levels of racial/ethnic heterogeneity have higher levels of property crime, neighborhoods surrounded by areas with higher levels of ethnic/heterogeneity have lower levels of violent and property crime. For violent crime, our region variable for western cities was positive and significant, while our measure of population density was a negative and significant predictor in our property crime models. We detected no significant results for our remaining city-level control variables, including our measure of economic segregation.

Discussion and Conclusion

A long line of research has examined the relationship between inequality and crime, although much of this literature has focused on larger units of analysis such as cities or SMSAs. Prior studies have not been able to examine the effect of inequality within and across neighborhoods on neighborhood crime. We find that the surrounding neighborhood context impacts neighborhood crime, however, this effect is dependent on the type of crime occurring in the surrounding neighborhood. Furthermore, given the recent emphasis of placing neighborhoods within the larger environment they are located (Kirk and Laub, 2010; Mears and Bhati, 2006), we also tested whether and to what extent the broader, macro-level context influences neighborhood crime net of characteristics in both the focal and spatially proximate areas. The economic context of the city plays a significant role in determining the extent to which disadvantage at the neighborhood level is predictive of crime. Therefore, it is not enough to

simply focus on the context of the neighborhood, but rather the surrounding area and city contexts play a larger role than previously thought in establishing neighborhood levels of crime (Browning, Feinburg and Dietz, 2004; Mears and Bhati, 2006; Morenoff, Sampson and Raudenbush, 2001). We evaluated these relationships using three theories—social disorganization, opportunity theories, and relative deprivation—that have been used prominently for understanding variations in neighborhood crime and violence. Notably, all three theories found at least some confirmation in some of the results, although no theory was able to explain all of the results.

The results of our violent and property crime models were most consistent with relative deprivation theory. For example, higher levels of inequality *within* the tract explained higher levels of violent crime, consistent with relative deprivation theory. This suggests that the strain residents experience due to an unequal distribution of resources is manifested in increased crime. Also consistent with relative deprivation theory, a low disadvantage neighborhood will have higher property crime if surrounded by high disadvantage neighborhoods. Although higher levels of neighborhood disadvantage were predictive of higher property crime rates, this relationship was diminished when we accounted for the characteristics in the surrounding neighborhoods. This suggests that residents are aware of and influenced by the distribution of resources both within their own neighborhood, but in the nearby areas as well, and this can influence crime. Furthermore, a high disadvantage neighborhood will have a higher violent crime rate if it is located within a city with *low* disadvantage than if it is in a city with high disadvantage. The consequence of this concentration of violence within a neighborhood is particularly pronounced in these low disadvantaged cities. In this case, the economic deprivation and isolation residents in disadvantaged neighborhoods experience likely contributes to greater

strain, and absent legitimate coping strategies, results in increased crime (Agnew, 1999). Similar findings were detected for property crime. Relative deprivation theory argues that strain-inducing feelings among residents are tempered when the surrounding areas are also highly disadvantaged, since the relative disparity in resources is reduced. Importantly, it is the only theory of the three considered here that predicted these observed macro context relationships.

Consistent with opportunity theories is the importance of differences in the level of disadvantage in *nearby areas* compared to the neighborhood itself for levels of property crime. To capture how this broader context might influence crime, we tested a series of interactions. Neighborhoods surrounded by high levels of concentrated disadvantage had higher property crime rates, and this relationship was exacerbated if the focal neighborhood had *low* levels of disadvantage. Whereas one possibility is that high concentrated disadvantage neighborhoods will have more property crime if they are surrounded by low disadvantage neighborhoods because they have relatively lower guardianship, our results were not consistent with this hypothesis. Instead, the strengthening of this relationship when the focal neighborhood had lower disadvantage suggests that when there are few opportunities in the neighborhood, motivated offenders will travel to locations where such opportunities are still available. Although this is consistent with a model that individuals in nearby areas are committing property crimes in the focal neighborhood because of the greater number of available resources, it is also consistent with relative deprivation theory's postulate that this nearby inequality will bring about more offenders. We cannot assess why this relationship was observed, and leave for future research to explore this possibility. Opportunity theories do not predict the cross level interactions we observed between neighborhood and city-level disadvantage, so we do not interpret these findings within an opportunity theories context.

We found modest evidence in support of social disorganization theory primarily for the violent crime models. For instance, although we found that fewer economic resources in the neighborhood are associated with more violent crime, we found that higher levels of concentrated disadvantage in the surrounding areas are associated with even higher violent crime in the focal neighborhood; this finding is consistent with social disorganization theory. These disadvantaged neighborhoods are clustered together within the city, and therefore represent a concentration of poverty, unemployment, and weak social control—conditions ripe for crime. These disadvantaged neighborhoods are also likely to have little in the way of resources or social capital to alleviate crime, allowing it to thrive. However, the negative interactions we observed between neighborhood disadvantage and either nearby or city-level disadvantage on violent crime are not predicted by the social disorganization theory.

These results have important policy implications. Although we found that higher levels of inequality within the tract were associated with higher levels of violent and property crime, the findings reported here also suggest that residents are certainly not impervious to the larger, macro environment within which they reside. Cities, then, should play a larger role in ameliorating crime in relatively disadvantaged neighborhoods. For example, given the weak political capital that characterizes most disadvantaged neighborhoods, they generally have few resources available that might reduce the strain experienced by individuals in those neighborhoods. For example, the placement of employment centers (Fleischer, 2004), healthcare facilities (Wallace and Papachristos, 2012) or domestic violence resources (Parker and Hefner, 2015), or other types of organizations providing legitimate coping mechanisms would likely reduce crime. Further, crime and victimization in disadvantaged neighborhoods could be alleviated though the development of community ties to government officials (Vélez, 2001). One

avenue through which this might be accomplished is community policing programs, which have been found to improve community relations, disorder perceptions and policy legitimacy (Gill, Weisburd, Telep, Vitter and Bennett, 2014). Thus, cities can play an important role in mitigating the barriers disadvantaged neighborhoods encounter to reduce criminal behavior that might be invoked by a sense of inequality.

Furthermore, cities will not want to focus only on specific neighborhoods, but also take into account *nearby* neighborhoods. Policies that are able to mitigate economic disadvantage in key neighborhoods will likely have a spatial spillover effect for property crime in nearby *non-disadvantaged* neighborhoods. This suggests the need to organize anti-crime efforts not only in disadvantaged neighborhoods, but also in the neighboring, less disadvantaged areas. The use of faith-based organizations has been instrumental in unifying community members from different neighborhoods to fight against crime and disorder. In Philadelphia, for instance, a partnership between a faith-based organization and research organization was critical in facilitating community-wide efforts to address neighborhood blight (Shlay and Whitman, 2006). Conversely, for violent crime it appears that it is the clustering of disadvantaged neighborhoods in close proximity that is particularly problematic. Simply reducing disadvantage in the focal neighborhood will still result in spillover violence from nearby disadvantaged neighborhoods. One neighborhood characteristic that has been found to ameliorate neighborhood violent crime is collective efficacy (Sampson, Raudenbush and Earls, 1997). This suggests building neighborly ties. Establishing forums for adults and parents to develop relationships or encouraging adult supervision of youth leisure time (Sampson, 2011) are a few mechanisms that might bolster resident relations and strengthen collective efficacy, although we emphasize they would need to be implemented in adjacent disadvantaged neighborhoods as well.

We acknowledge some limitations of this study. There are a number of theories that address the relationship between the economic environment and crime, including conflict theories (Bonger, 1916; Chambliss, 1978) and subcultural theories (Cloward and Ohlin, 1960; Matza, 1964; Miller, 1959; Thrasher, 1933); therefore, it is possible that other theories are at work. Additionally, the theories we do examine overlap conceptually. Without measuring the actual mechanisms involved, it is difficult to ascertain which theory is at work. For instance, although we observed many instances where inequality within or across neighborhoods was associated with higher rates of crime, we cannot determine if this is due to relative deprivation or opportunity theories. Future research would need to assess the hypothesized mechanisms of these theories to better understand the variations across context and crime type observed in this study. Nonetheless, we highlight that at least some of the results were consistent with each of the theories, but none of the theories explained *all* of the results. Therefore focusing on only one of these theories in future research does not seem advisable. We also lack individual information associated with these criminal events and therefore were unable to determine how and to what extent an individual might assess his/her own neighborhood relative to the surrounding context, or the extent that individual differences might matter above and beyond neighborhoods and the broader context within which they are embedded. Our focus instead was on aggregated patterns. Likewise, we are unable to account for crime-trip distance, a particularly important consideration when considering crime in the nearby areas, but instead utilized insights from the existing literature in formulating the predictions of the theories. Future studies should attempt to incorporate such information. Furthermore, our findings are not generalizable to spatially isolated neighborhoods, as they were omitted from the analysis. However, because spatially isolated areas are likely minimally influenced by their nearest neighborhood, it is not likely that

their omission is consequential for the findings reported here. Finally, the limitations of official crime data are well documented. Violent and property crime events were only included in our analyses if they were reported to police, and there may be variations in reporting practices across cities. Importantly, Baumer (2002) found no evidence that the tendency to report Part 1 crimes is related to the level of disadvantage in the neighborhood. Nonetheless, future research will want to include self-reports of violent and property crime.

Despite these limitations, this study fills an important gap in knowledge by testing the extent that variations in neighborhood crime can be explained by levels of disadvantage within neighborhoods and in the broader areas that neighborhoods are embedded. This study has shown that not only are neighborhood characteristics important, but so are the characteristics in the city and surrounding areas. Levels of disadvantage in the surrounding neighborhoods and the larger city were influential in understanding rates of neighborhood violent and property crime. Whether higher crime rates occur in this larger context because it reflects that reference groups in relative deprivation theory extend beyond the local neighborhood, or because offenders do not limit their activity only to their own neighborhood, is uncertain. It is clear that these spatial patterns are important, need to be accounted for, and sometimes differ between violent and property crime.

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Table 1: Theoretical predictions for effect of disadvantage (at various geographic aggregations) on neighborhood crime rates

	Neighborhood	Nearby	City	Neighborhood X Nearby	Neighborhood X City
Social Disorganization (Violent and Property Crime)	+	+	+	+	+
Opportunity Theories (Property Crime)	-	+	NA	-	NA
Opportunity Theories (Violent Crime)	+	+	NA	+	NA
Relative Deprivation (Violent and Property Crime)	+	NA	NA	-	-

Note: NA is not applicable; + is a positive effect; - is a negative effect.

Table 2: Summary Statistics Used in Analysis**

	Tract		Spatial lag		City	
	Mean	**St. Dev**	**Mean**	**St. Dev**	**Mean**	**St. Dev**
Dependent Variables						
Violent crime, rate per 1,000 (logged)	2.13	0.92				
Property crime, rate per 1,000 (logged)	3.88	0.72				
Independent Variables						
Concentrated disadvantage 2000	-0.01	1.02	-0.03	1.02	-0.02	1.02
Poverty	18.3	13.8	18.8	8.9	17.8	5.1
Unemployment	8.6	7.0	8.8	4.3	7.8	2.6
Average Family Income	60,480	36,758	60,225	21,066	60,421	11,673
Percent Single Parent Households	19.9	13.1	19.8	7.5	19.5	5.5
Median Home Value	120,909	103,241	120,446	68,229	137,177	67,231
Residential stability	-0.03	0.99	-0.06	0.97	-0.09	0.91
Percent in tract in same house five years ago	49.3	13.7	49.1	7.3	48.2	5.5
Average length of residence	9.9	3.7	9.9	2.0	9.4	1.5
Percent Homeowners	51.1	24.7	50.3	14.7	49.6	9.4
Racial/ethnic heterogeneity	8.5	19.9	8.2	12.2	58.2	12.0
Percent occupied units	93.0	5.9	93.0	3.8	93.2	2.7
Percent black	26.3	33.2			24.9	18.5
Percent Latino	20.5	25.3			21.3	16.2
Relative Deprivation (Gini Coefficient)	42.2	6.8			45.8	3.5
Population Density					11,091	6,706
Economic Segregation					0.39	0.06

*** To reduce potential problems associated with multicollinearity, all variables were mean centered for the analysis*

Table 3. Models Predicting Violent Crime Rate

	Model 1 i=7956; j=79		Model 2 i=7956; j=79		Model 3 i=7956; j=79		Model 4 i=7956; j=79		Model 5 i=7956; j=79		Model 6 i=7956; j=79	
Tract level measures												
Concentrated disadvantage 2000	0.368	**	0.298	**	0.302	**	0.297	**	0.338	**	0.297	**
	(0.023)		(0.018)		(0.018)		(0.016)		(0.018)		(0.017)	
Residential stability	0.004		-0.009		-0.009		-0.007		-0.007		-0.007	
	(0.007)		(0.008)		(0.008)		(0.008)		(0.008)		(0.008)	
Racial/ethnic heterogeneity	0.003	**	0.003	**	0.003	**	0.003	**	0.003	**	0.003	**
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Percent occupied units	-0.026	**	-0.022	**	-0.022	**	-0.023	**	-0.023	**	-0.023	**
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Percent black	0.008	**	0.007	**	0.006	**	0.006	**	0.006	**	0.006	**
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Percent Latino	0.006	**	0.004	**	0.004	**	0.004	**	0.004	**	0.004	**
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Relative Deprivation (Gini Coefficient)	0.022	**	0.016	**	0.016	**	0.016	**	0.016	**	0.016	**
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Spatially lagged measures												
Concentrated disadvantage 2000			0.260	**	0.262	**	0.256	**	0.269	**	0.243	**
			(0.021)		(0.022)		(0.022)		(0.022)		(0.022)	
Residential stability			-0.037	**	-0.038	**	-0.040	**	-0.040	**	-0.040	**
			(0.010)		(0.010)		(0.010)		(0.010)		(0.010)	
Racial/ethnic heterogeneity			-0.003	**	-0.003	**	-0.004	**	-0.004	**	-0.004	**
			(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Percent occupied units			-0.010	**	-0.010	**	-0.010	**	-0.011	**	-0.010	**
			(0.003)		(0.003)		(0.003)		(0.003)		(0.003)	
City level measures												
Concentrated disadvantage 2000					-0.156	**	-0.217	**	-0.249	**	-0.197	**
					(0.047)		(0.050)		(0.054)		(0.049)	
Residential stability					0.086	*	0.087	*	0.089	*	0.092	*
					(0.038)		(0.039)		(0.038)		(0.039)	

Racial/ethnic heterogeneity					0.002		0.002		0.003		0.003	
					(0.003)		(0.003)		(0.003)		(0.003)	
Percent occupied units					0.006		0.008		0.010		0.007	
					(0.016)		(0.016)		(0.016)		(0.016)	
Percent black					0.015	**	0.014	**	0.012	**	0.014	**
					(0.003)		(0.003)		(0.003)		(0.003)	
Percent Latino					0.002		0.003		0.002		0.002	
					(0.003)		(0.003)		(0.003)		(0.003)	
Relative Deprivation (Gini Coefficient)					0.004		0.005		0.006		0.004	
					(0.015)		(0.015)		(0.015)		(0.015)	
Economic Segregation					1.168	†	1.267	†	1.291	*	0.323	
					(0.640)		(0.646)		(0.649)		(0.752)	
Population Density					0.000		0.000		0.000		0.000	
					(0.000)		(0.000)		(0.000)		(0.000)	
West					0.220	*	0.230	*	0.226	*	0.230	*
					(0.091)		(0.092)		(0.091)		(0.092)	
South					0.057		0.068		0.082		0.075	
					(0.091)		(0.092)		(0.092)		(0.092)	
Interactions												
Tract X spatial lag Conc Disadvantage							-0.010		-0.011	†	-0.028	**
							(0.006)		(0.006)		(0.007)	
Tract X city Conc Disadvantage							-0.043	**	-0.045	**		
							(0.013)		(0.014)			
Spatial lag X City Conc Disadvantage									-0.058	**		
									(0.018)			
Tract X Spatial lag X City Conc Disadvantage									-0.038	**		
									(0.007)			
Tract Conc Disadvantage X City Eco Segregation											-0.280	
											(0.233)	
Spatial lag Conc Disadvantage X City Eco Segregation											-0.485	
											(0.327)	
Tract X Spatial lag Conc Disadvantage X City Eco Segregation											0.300	**
											(0.104)	
Intercept	1.990	**	2.040	**	2.084	**	2.068	**	2.089	**	2.047	**
	0.039		(0.042)		(0.067)		(0.067)		(0.066)		(0.067)	

p=<.001***; p=<.01**; p=<.05*

Table 4. Models Predicting Property Crime Rate

	Model 1 i=7956; j=79		Model 2 i=7956; j=79		Model 3 i=7956; j=79		Model 4 i=7956; j=79		Model 5 i=7956; j=79		Model 6 i=7956; j=79	
Tract level measures												
Concentrated disadvantage 2000	0.210	**	0.133	**	0.141	**	0.124	**	0.120	**	0.108	**
	(0.026)		(0.022)		(0.023)		(0.019)		(0.020)		(0.017)	
Residential stability	-0.080	**	-0.098	**	-0.097	**	-0.092	**	-0.093	**	-0.093	**
	(0.008)		(0.009)		(0.009)		(0.009)		(0.009)		(0.009)	
Racial/ethnic heterogeneity	0.003	**	0.003	**	0.003	**	0.002	**	0.002	**	0.002	**
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Percent occupied units	-0.022	**	-0.019	**	-0.019	**	-0.020	**	-0.020	**	-0.020	**
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Percent black	0.001	*	-0.001	*	-0.001	*	-0.001	*	-0.001	*	-0.001	*
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Percent Latino	-0.003	**	-0.004	**	-0.005	**	-0.005	**	-0.005	**	-0.005	**
	(0.000)		(0.000)		(0.000)		(0.000)		(0.000)		(0.000)	
Relative Deprivation (Gini Coefficient)	0.020	**	0.014	**	0.015	**	0.015	**	0.015	**	0.015	**
	(0.001)		(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Spatially lagged measures												
Concentrated disadvantage 2000			0.254	**	0.275	**	0.238	**	0.234	**	0.229	**
			(0.023)		(0.025)		(0.024)		(0.024)		(0.023)	
Residential stability			-0.025	*	-0.022	†	-0.031	**	-0.031	**	-0.033	**
			(0.011)		(0.012)		(0.012)		(0.012)		(0.012)	
Racial/ethnic heterogeneity			-0.003	*	-0.002	*	-0.004	**	-0.004	**	-0.005	**
			(0.001)		(0.001)		(0.001)		(0.001)		(0.001)	
Percent occupied units			-0.011	**	-0.012	**	-0.015	**	-0.016	**	-0.015	**
			(0.004)		(0.004)		(0.004)		(0.004)		(0.004)	
City level measures												
Concentrated disadvantage 2000					-0.170	**	-0.133	**	-0.164	**	-0.157	**
					(0.051)		(0.050)		(0.052)		(0.050)	
Residential stability					-0.039		-0.039		-0.044		-0.021	
					(0.040)		(0.039)		(0.038)		(0.039)	
Racial/ethnic heterogeneity					-0.004		-0.002		-0.002		-0.001	
					(0.003)		(0.003)		(0.003)		(0.003)	

Percent occupied units					0.002		0.004		0.002		0.004	
					(0.016)		(0.016)		(0.016)		(0.016)	
Percent black					0.009	**	0.008	**	0.009	**	0.007	*
					(0.003)		(0.003)		(0.003)		(0.003)	
Percent Latino					0.007	**	0.006	*	0.007	**	0.006	*
					(0.003)		(0.003)		(0.002)		(0.003)	
Relative Deprivation (Gini Coefficient)					0.005		-0.001		0.001		-0.004	
					(0.015)		(0.015)		(0.015)		(0.015)	
Economic Segregation					0.104		0.160		-0.017		0.225	
					(0.634)		(0.624)		(0.626)		(0.641)	
Population Density					-0.00003	**	-0.00003	**	-0.00003	**	-0.00003	**
					(0.000)		(0.000)		(0.000)		(0.000)	
West					0.011		0.013		0.004		0.029	
					(0.092)		(0.090)		(0.088)		(0.090)	
South					-0.153	†	-0.140		-0.155	†	-0.110	
					(0.092)		(0.091)		(0.090)		(0.091)	
Interactions												
Tract X spatial lag Conc Disadvantage							-0.073	**	-0.072	**	-0.087	**
							(0.008)		(0.008)		(0.008)	
Tract X city Conc Disadvantage							-0.051	**	-0.047	**		
							(0.015)		(0.015)			
Spatial lag X City Conc Disadvantage									-0.034	†		
									(0.020)			
Tract X Spatial lag X City Conc Disadvantage									0.000			
									(0.008)			
Tract Conc Disadvantage X City Eco Segregation											-0.900	**
											(0.230)	
Spatial lag Conc Disadvantage X City Eco Segregation											-0.693	*
											(0.345)	
Tract X Spatial lag Conc Disadvantage X City Eco Segregation											0.132	
											(0.116)	
Intercept	3.930	**	3.979	**	3.940	**	3.966	**	3.985	**	3.953	**
	0.035		(0.037)		(0.061)		(0.060)		(0.060)		(0.060)	

p=<.001***; p=<.01**; p=<.05*

Figure 1: Effect of interaction of Neighborhoods Concentrated Disadvantage and Concentrated Disadvantage in Surrounding Neighborhoods on Neighborhood Property Crime

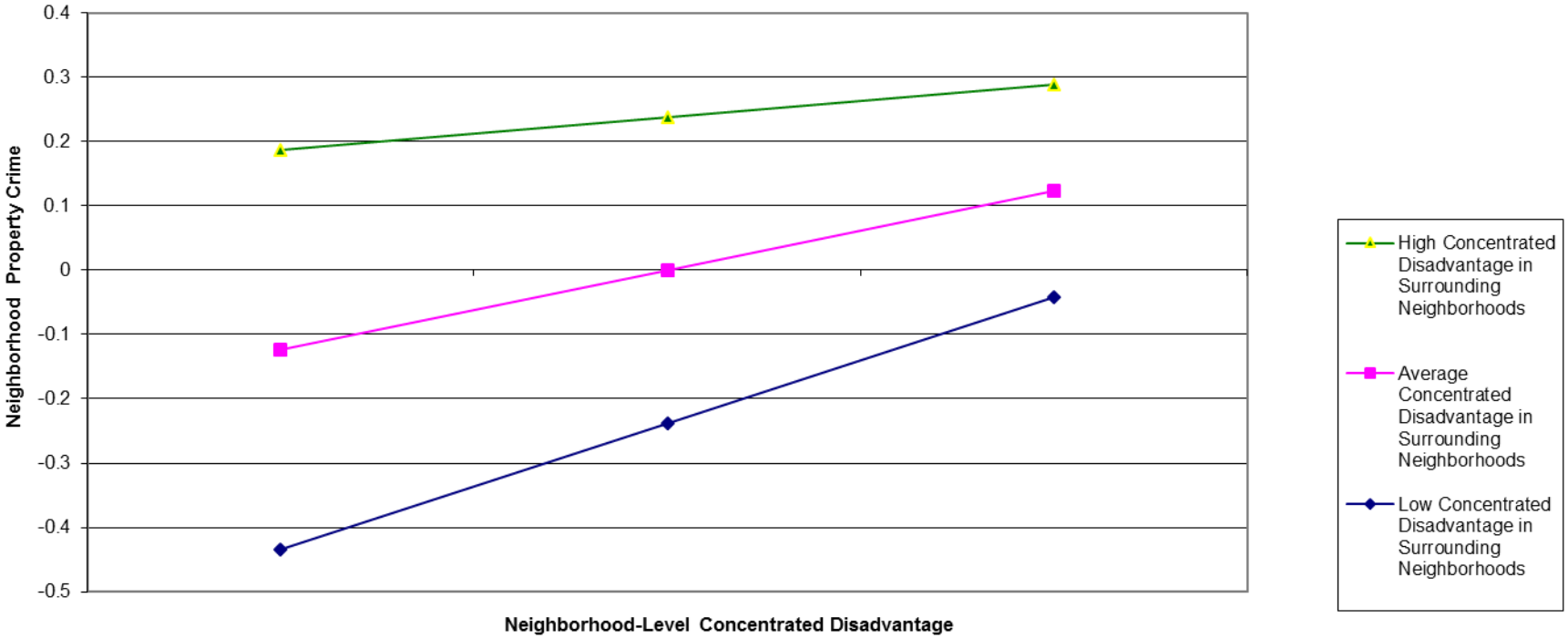

Figure 2: Effect of interaction of Neighborhood Concentrated Disadvantage and City Concentrated Disadvantage on Neighborhood Property Crime

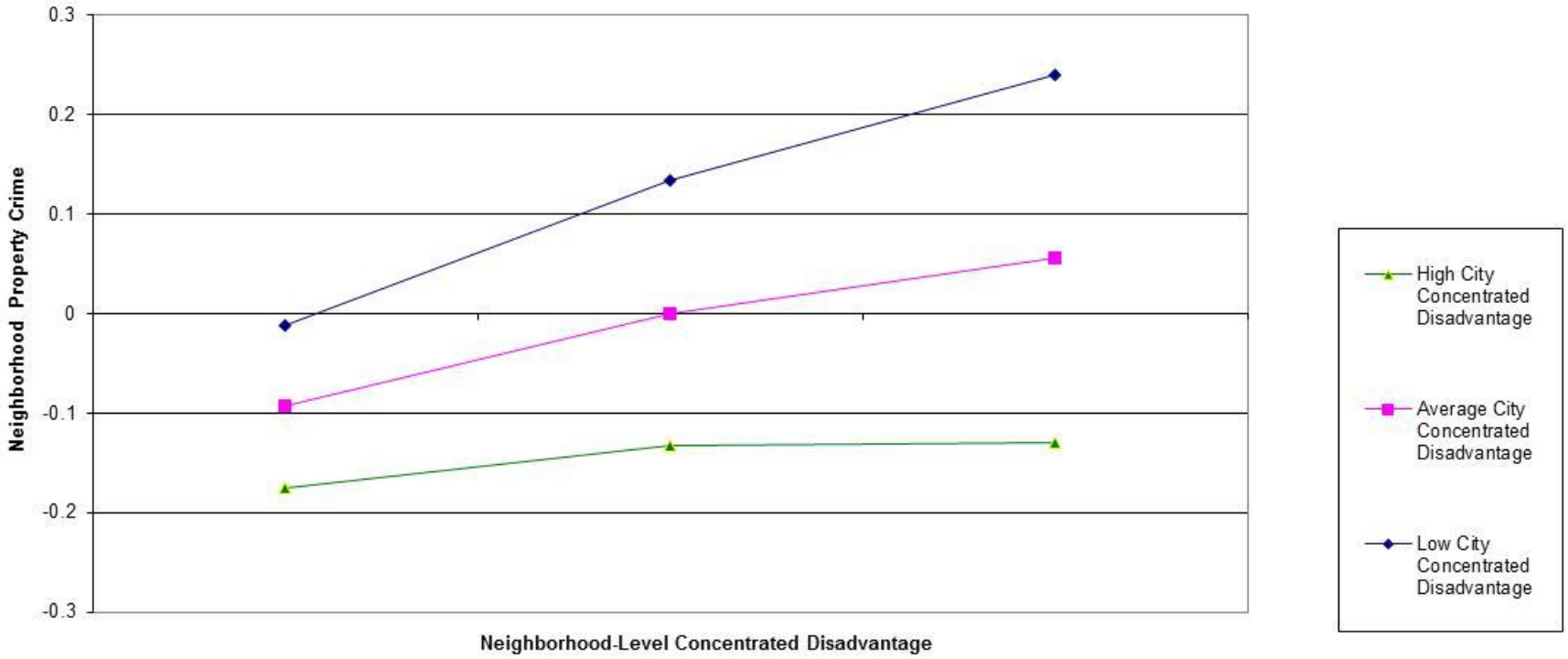

Figure 3: Effect of Interaction of Neighborhood Concentrated Disadvantage , Spatial Lag of Concentrated Disadvantage and City Concentrated Disadvantage on Neighborhood Violent Crime