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Neighborhoods, Social Networks, and Crime

John R. Hipp and *Adam Boessen*

A key theme running throughout Ruth Kornhauser's (1978) analysis and critique of social disorganization theory in *Social Sources of Delinquency* is the importance of social structure relative to conceptions of culture. As one consequence, social networks were implicitly important for Kornhauser's argument, in part because social networks underlie social disorganization theory, but also in part because networks constitute pure structure. Thus, one of the legacies of Kornhauser's thinking is the importance of social networks for neighborhood context. Indeed, social networks underlie many theories of the impact of neighborhood effects for crime rates. We can conceptualize the social ties between residents (however defined) to constitute the fabric of the social "context" of the neighborhood. If there were no social ties between households, all households would be isolated pods. In that case, there would be little reason to expect an effect of social context on the amount of neighborhood crime---individual-level theories could be employed in an effort to explain the spatial distribution of crime and delinquency across a city. Thus, the presence of ties enables a social context.

When considering the context in which residents live, this includes both: 1) a physical context, and 2) a social context. The physical context includes various features that the environmental criminology literature has noted as important for fostering crime events. Thus, the street structure, the presence of parks, the type and usage of buildings in an area (whether residential, commercial, industrial, etc.) are all examples of the physical environment that can affect the level of crime. The social context has been the focus of numerous studies in the

neighborhoods and crime research in the social disorganization tradition. Measuring the social

context is a challenge, and a debate identified by Kornhauser is the extent to which it should be

considered a purely structural characteristic or as a cultural characteristic. Arguably, the social

network of a neighborhood captures the structure of the neighborhood social context, while

social capital taps one aspect of the culture within a neighborhood. Given the importance of

"neighborhood" and social networks, a challenge is how to measure these constructs.

We propose that a useful exercise is to define the principles that underlie the notion of

"neighborhood". Inherent in this consideration is the role of social networks in neighborhoods,

and how the social network is both determined by the neighborhood, and constitutive *of* it.

Understanding these principles is a necessary first step before we can seriously consider possible

definitions and consequences of "neighborhoods."

We suggest that there are four key principles that should be considered when defining

neighborhoods: 1) proximity, 2) similarity, 3) familiarity, and 4) collective goods. The first three

of these come from the psychology of liking literature, whereas the fourth comes from the

sociology of organizations literature as well as the collective action literature. We argue that the

first three of these also play an important role in *tie formation*, and therefore they can impact the

social network within a neighborhood. We will then argue that the networks within such

neighborhoods have three key purposes: 1) enhancing cohesion, 2) enhancing information flow,

and 3) enabling responses to collective goods.

Networks: What Does a "Tie" Mean?

Before considering the possible role of social networks for neighborhood crime, a

necessary first step is to begin by asking what constitutes a tie. For social network analysis,

there are two main ingredients in a network – nodes and edges. The *nodes* are the points in a network, and represent the units within the network (typically these are persons, but they can be virtually any other unit such as organizations, neighborhoods, and countries). The *edges* are the links between the nodes (the "ties"), and constitute whatever relationship the researcher determines constitutes a "tie."

Thus, determining when an edge is present is a fundamental decision in social network analysis, and a very large number of relationships are possible, even in the specific context of neighborhood research (Butts 2009). For example, when do we consider a "tie" to exist between two residents? Is it when they know each other's name? Is it when they nod and say hello? Is it when they have at least brief conversations on the street? Is it when they are socially close enough to engage in social activities one on one? Alternatively, does a tie exist when they simply recognize one another, since familiarity with nearby residents might be enough to create a sense of attachment to a neighborhood in some perspectives? All of these are possible definitions of a "tie," and the choice is not a trivial one. In fact, the definition of a tie is a crucial decision in neighborhood networks research given that it will impact what the resulting network structure will look like.

To make this decision of what constitutes a tie requires asking how we theoretically expect ties in a neighborhood to accomplish the task of reducing crime. To determine what constitutes a tie, we need to ask how networks might impact the various processes that are presumed to bring about social control that can then reduce crime levels. If the various processes only need a modest awareness of the other person(s) to enable the network to perform its desired action, then one could use a definition of tie that would be considered "weak." In the previous examples, this might be instances when residents simply know each other's names. However, if

the various processes require individuals to work together more closely, or require a sense of emotional connection, then one would want to use a definition of tie that would be considered "strong." Strong ties are those in which the persons spend more time together, and the time is more emotionally intense (Marsden and Campbell 1984). In the previous examples, this might be persons in which they spend time together relatively frequently.

Once determining the definition of a tie, we can then view the spatial distribution of the network of residents. There is evidence that social ties are more likely to form with others who are closer in physical space (Caplow and Forman 1950; Festinger, Schachter, and Back 1950; Hipp and Perrin 2009). This tendency for propinquity in social ties has consequences for what the spatial distribution of a city network will look like. Butts, Acton, Hipp, and Nagle (2011) demonstrated how the simple insight of social ties forming based on a distance decay function, along with the actual spatial distribution of where residents live in various cities, will give rise to macro consequences for the resultant city social networks. This also raises the question of whether we should study all ties within a city, or just those within a neighborhood. Many scholars have only focused on the ties between residents *within* a neighborhood. In addition to the questionable wisdom of only focusing on ties within the neighborhood, is the challenge of defining the actual boundaries of the neighborhood, as we consider shortly.

The challenge of determining what constitutes a "neighborhood" is an issue that Kornhauser did not address, but nonetheless is crucial. As a consequence, the construct of "neighborhood" sometimes appears analogous to Supreme Court Justice Potter Stewart's famous definition of "pornography": although one cannot provide a precise definition, we recognize a neighborhood when we see it. For scholars wishing to further our knowledge of social science, and for policy makers wishing to understand how to alter neighborhood processes that lead to

deleterious consequences, this is hardly a very satisfactory state of affairs. As a consequence, scholars are becoming increasingly aware of this particularly vexing issue that must be addressed to assess social context (Hipp 2007; Openshaw and Taylor 1979; Wong 2004). We address this issue next. Again, four principles are considered.

What Brings About A Neighborhood?

Proximity

The first fundamental principle of neighborhoods is the notion of proximity. A key feature of a neighborhood is physical contiguity: a neighborhood cannot be split in half by another neighborhood. Although there may be some instances in which a neighborhood may have certain physical features of the environment within them—such as a small park or lake—for the residents living on both sides of the physical feature to be considered a single neighborhood implies that the physical feature itself is part of the neighborhood. Such features in the center of a neighborhood may become *collective goods*, an issue that we address shortly. Although some scholars wish to define a *community of limited liability,* which is defined by the household's own personal social ties that are likely not bound to a contiguous geographic space (Hunter 1974; Janowitz 1952; Wellman 1999), such a formulation has little meaning for the notion of *neighborhood*.

What is the smallest size of a neighborhood? Given the geographic layout of most modern societies, it likely makes little sense to posit that a street block is contained in more than one neighborhood. Thus, we consider a street block with nonzero population to be a primary geographic unit when constructing neighborhoods, which follows the lead of others (Taylor

1997; Taylor, Gottfredson, and Brower 1984).[1] Street blocks contain the houses on both sides of a street until the street is intersected or ends. Given the evidence from the social network literature of the considerable amount of socializing that goes on among residents living on the same street block (Grannis 2009; Hipp and Perrin 2009), this is a prima facie reasonable minimum size building block for constructing neighborhoods.

Defining the maximum size of neighborhoods is more challenging. There is likely not an a priori definition that could be given. Instead, we suggest that this upper bound will be determined by the constraints imposed by the other principles we define. That is, constraints on a neighborhood requiring *familiarity* make it implausible for extremely large areas to qualify as a neighborhood. Likewise, issues of *collective goods* that we will argue below are crucial for a definition of neighborhood likely weaken to nonexistence as the size of the area increases.

What about the boundaries of a neighborhood? We see no a priori reason for these to necessarily be defined as hard or soft. That is, whereas most research defines neighborhoods as having non-overlapping boundaries that can be observed, we see no reason for this to be a *necessary* characteristic defining a neighborhood. Must all residents know which neighborhood they reside in and be able to define it? Again, we see no reason for this to be a necessary precondition for defining a neighborhood. This possible softness of boundaries has important implications when we consider issues of *collective goods*, and how residents respond to them, as we discuss below, but there is no reason for it to be a fundamental part of the definition of neighborhood.

For example, some recent work by Hipp and Boessen (2013) argues for relaxing the assumption that neighborhoods are non-overlapping, and conceives neighborhoods as *egohoods* that are explicitly overlapping. In this approach, a buffer of a particular size is drawn around

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[1]However, a nonzero block could be *part* of a neighborhood.

every block in a city, and each of these buffers (an egohood) is considered to have the usual properties of a neighborhood. Although this approach is radically different from the dominant non-overlapping boundary paradigm, there is no reason we cannot consider the social networks existing in these egohoods, and how they might have important consequences for crime levels.

Similarity-Homophily

A second key principle for neighborhoods is the notion of *similarity*. This notion is fundamental to neighborhoods, and arguably underlies virtually all current delineations of "neighborhoods." When the U.S. Census first codified something that they considered to be a neighborhood, they created census tracts in 1930 by clustering together smaller areas that were similar based on certain social characteristics (Green and Truesdell 1937). Recent scholarship in the geography literature (Duque, Anselin, and Rey 2007) uses algorithms that cluster smaller units together into larger aggregations with the fundamental guiding principle being the *social similarity* of the units being aggregated (a second key principle is providing rules for minimal and maximal acceptable size of neighborhoods). With the high level of racial segregation in current U.S. society, it is hardly surprising that many clustering algorithms use racial/ethnic similarity for determining neighborhood boundaries.

Why might similarity be important for the concept of neighborhood? Building on the psychology of liking literature (Zajonc 1984), persons prefer to interact with others who are similar to themselves. Thus, similarity is important because it affects the likelihood of social interaction with others nearby and therefore would increase the density of social ties. There is a literature discussing the importance of homophily for impacting social interaction among persons (Goodreau, Kitts, and Morris 2009; McPherson and Smith-Lovin 1987; McPherson, Smith-Lovin, and Cook 2001; Mouw and Entwisle 2006). Sometimes referred to as *social distance*, or

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as "Blau space," this difference between residents on certain salient social dimensions is posited to affect the likelihood of interaction. Furthermore, such similarity might even be a source of satisfaction to residents, much as similarity is posited to bring satisfaction to personal relationships in the psychology of liking literature (Heider 1958; Pettigrew 1998).

The importance of social distance and its possible effect on social interaction then raises the question of which social characteristics to focus on when assessing the similarity of households. Given that this is fundamentally a social phenomenon, it is difficult to posit social dimensions that will be important across all societies at all times. Nonetheless, certain characteristics might be important across nearly all societies. For example, residents who differ based on characteristics such as the presence of children, age, or marital status likely interact less frequently. Differences in power within the society are likely important: in a capitalist society, money and wealth are important sources of power, and are therefore likely important social dimensions. Other characteristics might be important in certain societies: for example, skin color or other markers of group membership with some ethnicity might have important effects. The religious beliefs and memberships of persons might be a salient dimension in certain societies. In all of these instances, characteristics are considered socially important when they potentially affect the formation of social ties, or when they are considered salient enough to engender a cognitive sense of difference from other persons' beliefs and values.

There is evidence that social ties within neighborhoods form based on homophily. For example, studies have found that residents in neighborhoods with more racial/ethnic heterogeneity have fewer social ties (Lowenkamp, Cullen, and Pratt 2003; Warner and Rountree 1997). A study of one community found that whereas residents were more likely to form social ties based on physical propinquity, they were also more likely to form ties based on similarity

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along a number of social dimensions, including wealth, age, marital status, and the presence of children (Hipp and Perrin 2009).

There is also evidence that this social distance can impact perceptions of crime and disorder in neighborhoods. For example, one study constructed a measure of social distance among all residents in micro-neighborhoods (typically eleven households constituted a micro-neighborhood), and found strong effects (Hipp 2010a). This measure was constructed along a number of social dimensions, rather than just focusing on race or socio-economic status, which is more common. It was found that individuals who are more socially distant from their neighbors perceived more social disorder and physical disorder. Contextual *nonlinear* effects were also found: crime was highest in micro-neighborhoods with the lowest *and* highest levels of social distance. Thus, a modest amount of social distance was the sweet spot leading to the lowest level of crime in the micro-neighborhood. Furthermore, social and physical disorder were both higher in micro-neighborhoods that were fractured based on social distance: that is, they had two sub-groups with low social distance within them, but high social distance across them. Thus, social distance appeared to have not only individual-level effects, but also structural effects, on perceptions of crime and disorder.

Another source of similarity may occur due to the physical environment. This can occur either due to the natural physical environment, or due to the human-made factors of the environment. For example, housing units built on a hill may create a sense of similarity among the units that sets them off from a nearby area. Likewise, units built along a river might also create such a similarity. More commonly, the effect of human factors on the environment will create similarity. For example, some housing structures are built in a very similar fashion, setting them off from nearby areas: a set of single family units will differ sharply from nearby

apartment structures with large numbers of units, which will differ yet from townhomes built around a common area and a moderate level of density. The density of the units, and the actual design of the structures, can create similarity in a geographic area.

One further source of similarity is the values and attitudes of residents. In part, such values and attitudes can be a function of similarity in social characteristics among residents. Indeed, this is why some residents refer to the "changing" of a neighborhood, when in fact they are referring to the new residents. For example, this change is often applied when discussing a younger generation that holds different values and norms, or when referring to new residents who are of a different socio-economic class, racial/ethnic class, or religious group, and therefore hold different values and norms. However, beyond the fact that certain values and attitudes may have a degree of correspondence with outward markers of certain individuals, a lack of similarity in attitudes and values can occur even among residents who do not differ on outward social markers. For example, the similarity in attitudes of residents towards how much upkeep they put into their units can be important. This notion will be discussed in depth when we discuss *collective goods*, but suffice it to say for now that residents may well be inclined to define the boundaries of a neighborhood based on the spatial distribution of persons with such attitudes that conform to their own.

Familiarity

A third key principle of neighborhood is the notion of familiarity. This is also the third pillar in the psychology of liking literature (Zajonc 1984). Familiarity creates a sense of comfort. Just as it manifests such comfort in interpersonal relationships, it can foster comfort in a physical environment. To the extent that persons attain a certain familiarity with an area, their

emotional attachment to the area will increase. And to the extent that persons attain a certain familiarity with the persons living in an area, they will also achieve a greater sense of comfort in the area. Such comfort can lead to feeling that this is "home," or where someone "belongs." Attachment is important because a consequence is that a person will feel part of a larger entity (a neighborhood), which can increase the likelihood of them engaging in activities that enhance the collective good of the neighborhood (i.e., engaging in informal social control behavior to reduce crime).

This familiarity can come about through several processes. One manner in which familiarity can come about is through the length of time a resident lives in a neighborhood. The longer someone lives in a neighborhood, the more they become aware of the various physical features, as well as the social opportunities. This can also impact their number of social ties, as studies have found that residents with longer residence in a neighborhood know more residents (Campbell and Lee 1992; Kasarda and Janowitz 1974; Logan and Spitze 1994; Sampson 1988; Sampson 1991). Studies have also demonstrated a contextual effect in which there are more social ties in neighborhoods in which residents in general have lived there longer (Logan and Spitze 1994; Sampson 1988; Sampson 1991; Warner and Rountree 1997). Another study of a single community found that it was *joint co-residence* that increased the likelihood of social ties forming: that is, the longer a pair of residents lived in the neighborhood the more likely they were to form a social tie (Hipp and Perrin 2009).

This residential stability, or instability, can also exhibit a pure structural effect on the neighborhood network, beyond its effect on general familiarity. In fact, residential instability can have nonlinear effects on the neighborhood network structure. In a neighborhood at equilibrium, it will have a particular network structure of ties among residents. If just a single

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household moves out of the neighborhood, the network structure will be only slightly changed. As time passes and this new household continues to live in the neighborhood, we would expect them to form a similar number of network ties as the household they replaced and return the network to the equilibrium structure. However, if several households move out, the network structure will change considerably, possibly even leading to a fracturing into cliques. The residents' perceptions of the neighborhood may change given the sense that the network is far less connected than before. To the extent that this further impacts tie formation, this can imply a downward trajectory for the degree of connectivity in this neighborhood network.

A second manner in in which familiarity occurs is by residents simply walking about. The area through which they walk attains a certain familiarity to them. In part this occurs because they become familiar with the various physical features of the environment. But it also attains familiarity if they see the same people on various occasions. Whether or not they speak to these persons, simple repetition of viewing the same persons will bring about this sense of familiarity. This notion underlies Grannis's (1998) formulation of *tertiary streets communities*. Of course, it is also possible that this will bring about repeated interactions with undesirable features of the physical environment, or undesirable persons in the environment. This would of course be a less positive form of familiarity. However, awareness of such undesirable physical features will bring about a first step in the development of a sense of a *collective good* for residents. To the extent that the area has *information flow*, this information may be conveyed to others, indeed bringing about a sense of a public good. We describe this at length below.

A third possibility that might develop familiarity is if a resident visited with a household on a specific block external to their own block. This is similar to the previous mechanism in which persons walking through an environment would be familiar with the physical and social

environment. In this case, a household that became friends with a household on a block some moderate distance from its own may well spend time visiting with this household. This repeated visiting with the household would both increase its own familiarity with other persons encountered on that block during such visits, but would also increase the familiarity of the households on the block with the first household that repeatedly visits. Such familiarity could then affect the spatial distribution of the networks in the larger community (Hipp, Butts, Acton, Nagle, and Boessen 2012).

A fourth possible source of familiarity can come from general meeting spots. These are sometimes referred to as the "great good place" (Oldenburg 1999), and they are common gathering places in an area to which residents return repeatedly. These will bring about a sense of familiarity as persons repeatedly observe the same residents at such locations. For example, a local grocery store might be such a location. If the store is very large and pulls customers from a large area, the probability of seeing the same persons in the store will be decreased considerably, reducing the possibility of fostering similarity. On the other hand, to the extent that the store is smaller, and pulls from a smaller geographic area, the likelihood of seeing the same persons in the store on repeated occasions will likely be higher. In this case, seeing the same persons can foster familiarity, even if one does not engage in conversations with them. To the extent that conversations are struck, this then has the potential to affect the social network of the neighborhood. Another such location might be a small restaurant that caters to a relatively small area of residents who frequent it often. To the extent that persons frequently dine in the restaurant, the probability of repeatedly seeing other persons will be increased, leading to greater familiarity. Likewise, a local coffee shop can be such a gathering spot. Furthermore, the

workers in the local grocery store, local restaurant, or coffee shop will also become familiar to the patrons.

Other locations that can serve as general meeting spots include shopping areas, parks, churches, and schools. In each of these instances, it is the repeated patronizing of such areas by persons that brings about this possibility of familiarity. A local shopping area that is patronized frequently by residents from a relatively small surrounding area will bring about familiarity. A park that mothers with children frequently patronize will foster a sense of familiarity, as well as likely foster social interaction. Churches will foster a sense of familiarity given that persons often are repeat attenders. And schools will foster familiarity as parents see others as they are transporting their children to school.

Note that in all of these cases this familiarity must be associated with a specific geographic area in order to generate a sense of "neighborhood." Thus, we hearken back to our first principle of *contiguity* in pointing out that to the extent that any of these gathering spots pull together persons from too broad and sparse a geographic area, they will not help create a sense of "neighborhood." For example, a church can create a strong sense of community among its parishioners. However, if these persons come from a relatively broad geographic area, and a large number of persons from that geographic catchment area do not attend the church, this sense of community will be specific to the church itself, and will not relate to the physical area of a neighborhood. This highlights that one important characteristic of meeting places is the proportion of patrons who actually live in the local geographic area. To the extent that it is only a small proportion of patrons, the sense of familiarity that is fostered may not be associated with the physical area that we might otherwise define as the "neighborhood." However, if a relatively high proportion of the patrons live in the local area, the familiarity that is attached to the location

would likely translate to the geographic area of the neighborhood. What exact proportion of patrons to a site that need to be residents to bring about such a cognitive translation is not obvious from first principles, and would therefore need to be empirically estimated.

Collective Goods

A particularly important principle of neighborhoods that we elaborate next is the notion of *collective goods*. This captures the idea that residents in an area can have shared interests. Thus, whereas individuals in a rational choice perspective maximize their own interests based on weighing costs and benefits, it is also possible for larger collectivities to develop a sense of common interests to be maximized based on a set of common costs and benefits. For example, a household will often recognize a shared set of interests, and therefore act to maximize those joint interests. Certain decisions may not necessarily maximize one household member's own interests because they more greatly maximize some other household member's interests. Or, a decision within a household can be made not because any one individual of the household benefits disproportionately, but simply because some shared interest is defined for all household members and this interest is then maximized. This notion can be extended to larger collectivities. For example, the organizations literature discusses this notion in describing how the organization can develop a sense of common dependence among its members, and therefore act in ways to address this common dependence. Or the residents of a city can come to identify the city as a collective unit of interest. In this case, they will be interested in engaging in activities that maximize the more general interests of the city itself as a collectivity.

Public goods are another example of a larger entity in which it is beneficial if the utilizers of it recognize their *shared interests* and therefore come to define it as a collective good. This builds on the important distinction between public and private space, as public goods exist in

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public space and therefore do not have an explicit owner. A public good is something that is both non-excludable and non-rivalrous: individuals typically cannot be excluded from accessing the good, and the use of the good by one person does not reduce availability of the good to others. For example, a park is a public good, since the benefits of the park cannot be monopolized by any person or group. Thus, residents' enjoyment of the park depends on the satisfactory maintenance and upkeep of the park. If persons using the park engage in behavior that lessens its desirability for other residents, this can negatively affect the enjoyment of the park for all. For example, if patrons of the park vandalize the bathroom, this will decrease the enjoyment of the park by others. Or, if persons using the park engage in behavior that is perceived as threatening to the safety or comfort of some potential park patrons, this will affect the extent to which the park retains a perception of a safe location in the eyes of local residents. To the extent that residents perceive it to be unsafe, it will lose its desirability as a destination.

There are other possible examples of public goods. For example, a shopping area is a potential collective good, as the streets and sidewalks within the area become locations in which undesirable activities can affect the enjoyment of residents. There is possibly a need for the community to protect this collective good. Schools are another possible collective good. In some instances residents can affect the quality of the school through various fund raising drives, and through donation of time and effort. When this occurs, the residents can increase the quality of the local schools, and all residents with children benefit as a consequence.

Related to the idea of collective goods is the idea of *externalities*, in the terms of the economics literature. Externalities can impact the residents in some particular locality. An example of an externality is a front yard. The upkeep of a front yard creates an externality for other residents. If some residents do not satisfactorily maintain their front yards, this will create

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a blemish on the environment for fellow residents and an unpleasant environment for others as they move through the neighborhood. Worse, it might even affect the values of the homes for others living nearby, which would create an economic measure of this negative externality. In contrast, a positive externality can be created by someone who puts considerable effort into landscaping and maintaining their front yard. Other residents are able to enjoy this benefit at no cost to themselves.

Defining other possible collective goods and externalities in a geographic environment is a crucial task, and we suggest that it would be an extremely fruitful task for pushing forward understanding of neighborhoods. Identifying such potential collective goods can help understand which geographic locations are more likely to form a sense of a neighborhood as a collectivity.

Beyond researchers identifying possible collective goods, it is important for researchers to explore under what circumstances residents *themselves* are able to identify such collective goods. That is, under what conditions are residents able to define common problems and interests? The social network among residents may play an important role in this process given that it can foster communication and information flow.

It is also possible that certain types of households are more cognizant of shared interests. Understanding which households will be able to identify collective goods would be a useful avenue of study for scholars. One likely important group is homeowners. Given that home values are, at least in part, dependent on the conditions of the nearby physical environment, persons who own their home will likely be particularly attuned to this notion of shared interests. Owners are more likely to be aware that the activities of others can have an impact on themselves by impacting the value of their home. For example, there is evidence that owners are more aware of physical disorder than are renters when viewing the same environment (Hipp

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2010b). Renters are less likely to develop this sense of shared interests. Nonetheless, even

renters can on occasion develop a sense of externalities to the extent that the presence of loud

parties by others impacts on their own lives, or to the extent that behavior in common areas

impacts on their ability to enjoy those common areas. Considering the possible collective goods

in a geographic area is a necessary first step when exploring which types of residents will be

more likely to identify these collective goods.

Consequences of Neighborhood Networks

Once defining a neighborhood, it then is necessary to measure the networks that exist in a

neighborhood, and the possible consequences of these networks for neighborhood crime rates.

Here we focus on the transmission and expression of networks. More specifically, we suggest

that networks are important because they can: 1) communicate information; 2) develop an

awareness of a collective good, and formulate responses to a problem; and 3) enhance cohesion.

Information Flow

We argue that one important role of networks is their ability to provide the conduit

through which information flows. Information flow may also have an impact on tie formation

(and dissolution), but it also likely has consequences for how neighborhoods might collectively

respond in a time of need. The information flow between residents can allow a piece of

information to saturate to everyone in a neighborhood (with the proviso that the content remains

perfectly intact). To the extent that the content does not remain intact, the information flow will

be lessened. It seems reasonable that this information flow (and by implication cohesion) will

follow a particular selection pattern. The way that a message spreads once inside a

neighborhood is likely dependent upon some of the aspects that we highlighted earlier for what

brings about a neighborhood. For instance, propinquity and homophily will likely impact the extent of the spread of a message and where the message travels in a neighborhood. Similarly, we have little understanding of how language barriers impact this information selection. One area of future research is to examine how a message spreads in a network, how redundant is the message, the consequences of the content of the message, and how the message is distorted as it moves through the network (e.g. see Allport and Postman 1945).

As one example of a step in this direction, Stanley Milgram (1967) solicited respondents in rural states (e.g., Kansas) and asked them to pass along a "lost letter" to another person. These letters often traveled through several people until eventually getting to the target contact in Massachusetts. While highlighting how people make sense of their different contacts when they need to accomplish a particular task, and the spatial distribution of these contacts, this study is a classic example of the selection path of information. This study is also the basis for the popular "six degrees of Kevin Bacon" and Erdös number phenomenon. Recent work from Sampson (2012) stems from Milgram's project to examine neighborhood altruism by dropping letters across the city of Chicago and exploring the spatial distribution of the rates at which letters were returned. All of these projects provide a foundation for understanding how chains of information might structure residents' responses to problems within the neighborhood or nearby area.

Response to Collective Action Problems

An important consequence of networks and the information they provide is that they can enhance a neighborhood's ability to sort out solutions to problems in their community. There are at least three main strategies to address collective action problems: 1) direct interaction, 2) procedures, and 3) institutions. We suggest that these notions of how a clearly bounded group such as an organization responds to such dependencies can fruitfully be applied to a less clearly

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bounded group, such as a neighborhood. These general principles can guide understanding of key neighborhood processes.

The first possible response to a collective good is through *direct interaction*. In this case, residents become aware of the common dependence, and how some person is negatively impacting this collective good, and then directly confront the person (see also Reynald 2011). In the case of a household that does not properly maintain their front yard in the view of others, a direct confrontation and conversation about the offending yard can be attempted to change the behavior of this household regarding the maintenance of their front yard. Another example of direct interaction comes from the neighborhoods and crime literature, which posits that the informal social control behavior of residents can reduce the amount of neighborhood crime (Taylor 1996; Taylor 1997). In this perspective, residents who observe persons in the neighborhood engaging in undesirable behavior (such as youth loitering on a street and harassing passersby), will then directly confront these persons and dissuade them from engaging in such behavior. In the schemas of Albert Hunter (1974), this is parochial social control. Indeed, the burgeoning collective efficacy literature focuses on the degree to which residents believe their neighbors are willing to engage in such behavior (Sampson, Raudenbush, and Earls 1997).

A second manner for addressing collective action problems is through the establishment of *procedures* for acceptable behavior. These are derived from the interactions with others in a collectivity (Goffman 1961). Ewick and Silbey (1998) highlight the ways in which law permeates everyday life, and these scholars argue that legality can take various possible forms, including folkways, routines, rules, and laws. For example, residents may maintain their landscaping around their house to maintain "acceptable" standards for their neighborhood (and the time of day when this landscaping occurs…no loud lawn mowers at night!). Through these

"law like" procedures, the networks and relationships between people in neighborhoods create the potential for cohesive groups and expectations for behavior, albeit simultaneously creating resistance or even residential mobility. Other scholars have discussed similar ideas through an expression of the "code of the street" (Anderson 1999). By having formal or informal laws of behavior, the residents of a collectivity may minimize the potential for conflict. The extent to which these procedures are known by others and agreed upon is in part arguably a function of the relationships between residents and the information available to them.

Institutions within and nearby neighborhoods are another approach for addressing collective action problems within the neighborhood. For example, neighborhood councils, schools, churches, voluntary organizations, restaurants, bars, and parks may serve as spaces for tie formation, but at the same time, these institutions are potential and actual hubs of information transmission between residents. These institutions may serve a particular function in the neighborhood (e.g. educating children), but also these places may help to bring information between residents (e.g. gossip between parents). Through these neighborhood institutions, more formalized procedures and informal expectations of behavior may be established, but less clear is how and under what conditions these institutions actually lead to changes for problems facing a community. Within these spaces, residents may also become aware and informed about problems in the area, and this may have consequences for their fear of crime, willingness to intervene in a neighborhood problem, ability to coordinate a response to a problem, and perception of the overall neighborhood quality. These institutions and the information flow between residents of a neighborhood may also help to bring about residents' sense of cohesion.

Cohesion

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A common theme running throughout the neighborhoods and crime literature is the focus on the importance of cohesion among residents for fostering the ability of neighborhoods to collectively respond to problems. Relationships, acquaintances, and many other forms of ties between people likely serve as the foundation for a sense of collectivity among residents. This cohesion is also pointed to as desirable in its own right for some residents through bringing about a sense of a collectivity, which can cause residents to behave in ways that further the quality of the neighborhood. Thus, cohesion is a consequence of a neighborhood's network, but it also has further positive consequences for the neighborhood in a potentially virtuous cycle.

Most research in the neighborhoods and crime literature measures cohesion based on the assessments of residents (Hipp and Perrin 2006; Sampson 1988; Sampson 1991; Sampson et al. 1997; Warner 2007). Thus, these studies focus on residents' perceptions of the level of cohesion. They are effectively attempting to capture the psychological manifestations of cohesion among residents within neighborhoods. However, it is also possible to measure cohesion with structural network measures, although this is almost never attempted in the neighborhoods and crime literature.

In the social network literature, there are a number of measures that are proposed to capture cohesion. All of these are *structural* measures. For example, the *density* of ties in an area is a measure of cohesion: that is, the proportion of ties that exist of all possible ties (Blau 1977; Lakon, Godette, and Hipp 2007). Thus, a neighborhood in which a higher proportion of possible ties actually exist would be considered a more cohesive neighborhood. Another possible measure is the number of ties per resident: this differs from the density of ties in that the denominator is the number of *persons* in a neighborhood, rather than the number of *possible ties* (Wasserman and Faust 1994). Thus, this measure focuses more on the *presence* of ties,

whereas the measure of density is implicitly more focused on the *absence* of ties, as such non-ties are included in the denominator. Another approach measures cohesion based on the redundancy of ties in an area or group (Moody and White 2003). The logic here is that in a cohesive collectivity, the removal of a single tie should not be able to disconnect the group. A different approach measures cohesion based on the relative presence of reciprocity in the collectivity (Forrest and Kearns 2001; Wasserman and Faust 1994). In general, reciprocity is a characteristic of a relatively strong tie, and strong ties will likely enhance the solidarity of the group. Yet another measure captures the relative inwardness of ties to the collectivity (Krackhardt and Stern 1988; Luccio and Sami 1969). That is, this measure focuses on the relative proportion of social ties directed to members of the collectivity compared to ties directed to members outside the collectivity. The assumption is that for a collectivity to be distinguished from other potential collectivities nearby, the members should be more inclined to interact with one another rather than to persons outside the collectivity.

One study took this a step further and attempted to define the boundaries of neighborhoods based on the structural *existence* of network ties (Hipp, Faris, and Boessen 2012). Although the idea is straightforward, actually measuring the social ties of all residents in a larger community is quite challenging. Hipp et al. demonstrated an approach that proxied the social ties within the larger community by measuring the social ties among the adolescents in the community. They then used a clustering routine based on the presence of these ties in an attempt to find the structural breaks in the social fabric captured by this network. Although such an approach may seem infeasible in general given the difficulty of collecting the network of all ties among residents, the continued advances in capturing such networks based on social media suggest that this may not always be difficult. If such data indeed become available at some

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point, attempting to measure the breaks in the network as a way to establish neighborhood boundaries may be a reasonable approach.

Ties to Other Neighborhoods

When researchers attempt to capture the extent of networks in the larger community or the potential for their control, almost all research exclusively focuses only on the relationships within the local subarea of a neighborhood, however defined. Although likely due to data collection challenges, rarely do researchers formally measure the relationships of residents and know where these relationships are spatially located, even though these relationships are expected to drive "neighborhood effects" (Entwisle, Faust, Rindfuss, and Kaneda 2007; Faust, Entwisle, Rindfuss, Walsh, and Sawangdeed 1999). While disagreeing on the precise mechanisms of control, social disorganization, systemic, and collective efficacy theories and empirical work stemming from them are all orientated to a framework where spatially local relationships are used to solve neighborhood problems. One critical and rarely tested assumption to these approaches is that residents will contact others spatially nearby when confronted with a neighborhood issue such as crime. Accordingly, one potential application and consequence of networks is their ability to make connections between neighborhoods, or what Hunter referred to as public social control (Hunter 1974).

Much research has highlighted a "diffusion" component to crime control (Cohen and Tita 1999; Guerette and Bowers 2009), and the information transmitted between people perhaps via gossip and rumors may be one way this diffusion takes place. The notion of Hunter's public control suggests that ties outside of the neighborhood are important for understanding what goes on within the neighborhood. This idea suggests a network of neighborhoods and draws from

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Granovetter's concept of weak ties, which might expose people to new information that is not redundant and link otherwise disconnected people. Although it is likely that most information will come from strong ties (or the weak ties of the strong ties), the general idea is that ties outside of the area will be crucial for understanding local problems.

While most neighborhood studies focus on local area effects, the majority of studies do not measure relationships outside of the local unit even though theory and empirical work would suggest the importance of ties outside of the local area (Bursik 1999). Using a sample of Detroit residents, Huckfeldt (1983) shows that approximately one-third of the respondents had no close friends within the neighborhood. This work also finds that less than 20 percent of the respondents reported having at least 3 close friends within the neighborhood. To further suggest that ties outside of the local area might be important, recent work on co-offending networks suggests that when youth offend together, 5.7 percent live in the same school district and live on average 4.9 miles apart (Schaefer 2011). The findings from this study suggest that offenders do not simply only offend within the local neighborhood, thereby ties are expected to extend outside of the neighborhood (see also Tita and Boessen 2011).

From the early beginnings of Shaw and McKay to Hunter's more recent notion of public control, the neighborhood crime literature suggests the importance of the kin and friendship ties for exercising community control and a neighborhood's ability to provide informal sanctions to delinquents (Shaw and McKay 1942). Given the salience of family ties, we may expect that kin relationships who do not live in the home but extend out far beyond the bounds of the local area will be critical for understanding how residents respond when faced with a local issue. A study from the social networks literature demonstrates that when people reach out for help in a time a need (e.g., help harvesting crops) they most frequently turn to family members for support who

live outside of the local area (Entwisle et al. 2007). Even though these residents who live outside of the local area may not be able to physically help intervene to stop someone from committing a crime in their family member's neighborhood, these extended relationships outside of the local area might at least provide information on how to respond in a time of need, or perhaps even emotional support after a crime has occurred (Boessen, Hipp, Butts, Nagle, Acton, Marcum, and Almquist 2011).

Although on a much different time scale (i.e. over years and decades), ties between neighborhoods can also occur through the sorting process of residential mobility. Scholars have examined patterns of residential mobility within Chicago as one approach to understanding the interdependencies between neighborhoods (Sampson and Sharkey 2008). Similarly, the demographic literature has often suggested a migration process in which ties from the previous residence extend to places where someone currently resides (Massey and Espana 1987; McKenzie and Rapoport 2010).

Another reason why we might expect that social ties exist outside the neighborhood is the fact that residents' daily activities can often take them outside their own neighborhood. People may travel outside of their local area for school, work, restaurants, grocery stores, or church to the extent that their needs are not met within the local area. For example, a survey of Los Angeles residents reported traveling eight miles on average to work, which is much larger than most conceptualizations of neighborhoods (Sastry, Pebley, and Zonta 2002). Similar to the activities in the home residential neighborhood, these sustained occupations in areas outside of the home neighborhood may have information flow, responses to collective problems, and cohesion. For instance, a group of businesses on the same block or employees at a business may foster their own sense of efficacy to respond to a new city ordinance, but at the same time this

interaction may foster ties between neighborhoods (i.e. these business employees' home areas) that are not otherwise spatially proximate.

Although there are many reasons to expect that social ties outside the neighborhood are important, virtually no research in the neighborhoods and crime literature has studied these. In large part, this omission is due to the difficulty in collecting such data. As a novel approach to addressing this problem, a recent study proposed examining the spatial distribution of residents in a city and then *simulating* the social network among all residents based on the simple insight that social ties form based on a distance decay function (Hipp et al. 2012). An advantage of this approach is that once the network is simulated, it is possible to construct various possible network measures that capture such important constructs as information flow and cohesion. Furthermore, the researcher is not constrained to only constructing network measures *within* a neighborhood, but can also construct network measures that span neighborhoods. It was notable that this study used only *simulated* networks but was able to robustly predict locations of crime across five separate cities. This approach has intriguing possibilities moving forward, as it is possible to also include the various social distance concepts we discussed earlier when simulating tie formation. Thus, this approach has the ability to combine information on the spatial distribution of residents across a city based on various characteristics (i.e, the segregation of a city) along with information on the social tie formation of residents. To the extent that social networks are indeed important for combatting crime in neighborhoods, we would expect this approach to provide fruitful results.

The Role of Heterogeneity in Neighborhood Networks

While we have focused mostly on how networks help to facilitate crime control, networks may also enhance deviant outcomes. Accordingly, a long line of criminological theory and

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empirical work has argued that youth with delinquent peers are expected to engage in more offending than youth without delinquent peers (Elliott and Menard 1996; Farrington 2004; Haynie 2001; McGloin and Shermer 2009; Sutherland 1947), and are often co-offenders (Schaefer 2011). More recently, this work has focused on terrorism networks (Krebs 2002; Moon and Carley 2007). However, research has noted that it is difficult to clearly determine cause and effect (Matsueda and Anderson 1998). For example, most research uses a youth's perception of his or her peers' delinquency as a predictor for the youth's offending (i.e., peer socialization). In turn, it also seems reasonable that youths may commit a delinquent act and then join a deviant peer group (i.e., peer selection). Research has also recently suggested that perceptions of peers may not be conceptually or empirically similar to network measures (Rebellon and Modecki 2013; Young, Barnes, Meldrum, and Weerman 2011). While there is also a literature on how networks can help understand the selection and socialization debate (see, e.g., Steglich, Snijders, and Pearson 2010), a less well understood idea is how different neighborhoods and contexts impact which process is at work or the structural features of networks that would make each more probable. Research has also shown that youths residing in disadvantaged neighborhoods are more likely to have deviant peers (Brody, Conger, Gibbons, Ge, McBride Murry, Gerrard, and Simons 2001). Consequently, if youth interact with delinquent peers and this in some way is related to more offending and neighborhood crime, delinquent peers would also contribute to more neighborhood disorder and crime, which was first suggested decades ago by Shaw and McKay (1942).

More recently research has linked networks and deviance with the study of gangs (Papachristos 2006; Pattillo 1998; Tita and Radil 2011), HIV and Aids (Morris and Kretzschmar 1997), drug injection and STDs (Frost, Brouwer, Cruz, Ramos, Ramos, Lozada, Magis-

Rodriguez, and Strathdee 2006), and through a negotiated coexistence model (Browning, Feinberg, and Dietz 2004).[2] While these examples demonstrate the consequences of deviant networks, limited research has explored this heterogeneity in tandem with more prosocial relationships in context. In fact, much of the literature on deviant outcomes and offenders in criminology is developing independent of neighborhood research, but there is no reason why this has to be case. For example, the spatial distribution of peers, the relationships between them, and the implications for sender/receiver attributes likely have important consequences for neighborhood crime.

All of the principals discussed in this chapter highlight some of the ways in which we might incorporate models of deviant behavior into neighborhood research. We think this is an interesting avenue for future research since deviants and non-deviants are likely to be connected in the web of social relations, and a focus exclusively on offenders only captures one aspect of the neighborhoods and crime process. One area of future research as discussed earlier would suggest more theoretical and empirical focus on when a tie is a tie, who are the people and processes we wish to capture (and not capture), and the spatial distribution of the ties, as well as an examination of how the data generation process (e.g., sampling, missing data) impacts the results of the study.

Conclusion

Social networks provide rich theoretical and empirical tools for understanding social entities, particularly neighborhoods that is quite broad and inherently interdisciplinary. In that sense, they follow naturally from the ideas of Kornhauser. Whereas much of the neighborhoods

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[2] Research has also focused on networks and white-collar crime, such as through coordinated price fixing (Baker and Faulkner, 1993).

literature uses implicit measures of social networks (e.g., ethnic heterogeneity of the area), the next step in this area is to explicitly capture social structure via networks and their spatial distribution. A challenge to employing the structural principles espoused by Kornhauser is defining the boundaries of neighborhoods, and the principles of defining neighborhoods that we have outlined here—proximity, similarity, familiarity, and collective goods—can be useful to researchers who wish to compare the "quality" of neighborhoods and identify the spaces in which new ties might form. For example, the institutions and organizations within an area may impact several of these dimensions. Identifying which of the dimensions they affect, and how much, can be helpful in identifying organizations or institutions that may be important for neighborhoods.

We have also suggested three characteristics that are important outcomes of neighborhood networks: information flow, cohesion, and responding to collective goods. These characteristics have an inherent valance to them, and this suggests they could be useful in constructing relative assessments of neighborhoods. The ability of a neighborhood to have cohesion, informal social control, or some coordinated collective response to a problem is likely crucially dependent upon relationships, their spatial distribution, and how information flows through these connections. Thus, these structural characteristics have important implications, as discussed by Kornhauser. Future research might use these processes to understand how networks create structures and social controls for understanding crime. Rather than only relying on residents' perceptions of their neighborhoods, social networks allow insight into the fabric of neighborhoods.

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