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The Spatial Distribution of Neighborhood Safety Ties: Consequences for Perceived Collective Efficacy?

Abstract

There is conflicting evidence in the literature regarding the relationship between residents' social networks and their perceptions of neighborhood collective efficacy. This study proposes addressing this challenge with several theoretically motivated refinements using a large spatially stratified sample of residents in the Western United States. First, we consider various distinct *types* of social relationships, and find that our novel measure of *neighborhood safety ties* is much more strongly related to perceived collective efficacy than is a measure of socializing relationships. Second, we explicitly account for the spatial distribution of ties, and find that it is not just local neighborhood ties that increase a sense of cohesion or informal social control, but that more spatially distant ties also matter. Third, we make a distinction between urban and rural areas, finding that in rural areas, social ties from an even broader area are associated with stronger feelings of collective efficacy.

Keywords: neighborhoods, social networks, spatial effects, collective efficacy

Bio

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

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Nicholas N. Nagle is a Professor and Head of the department of Geography at the University of Tennessee, Knoxville. His research involves problems of data integration, and small area estimation, and uncertainty in official statistics. He has served various roles with the NASEM Committee on National Statistics to evaluate and advise methodological changes at the US Census Bureau. His work has appeared in *Annals of the American Association of Geographers, Journal of the American Planning Association, and Journal of the American Heart Association.*

Emily Smith is a postdoctoral scholar at the University of North Carolina, Chapel Hill.

The Spatial Distribution of Neighborhood Safety Ties: Consequences for Perceived Collective Efficacy?

Urban scholars have utilized collective efficacy as a key construct over the last two decades (Mazerolle, Wickes, and McBroom 2010; Morenoff, Sampson, and Raudenbush 2001; Sampson, Raudenbush, and Earls 1997), and one long-standing interest is in the *determinants* of collective efficacy among neighborhood residents (Duncan, Duncan, Okut, Strycker, and Hix-Small 2003; Rhineberger-Dunn and Carlson 2009; Wickes, Hipp, Sargeant, and Homel 2013). A recurring question is what role neighborhood social networks play in fostering the two components of collective efficacy: the extent to which residents experience *a sense of cohesion*, and the *perception of a general willingness* to engage in informal social control. This parallels a longer-term interest on the part of urban scholars regarding how residents' social networks relate to their sense of attachment to the neighborhood, or cohesion in the neighborhood (Forrest and Kearns 2001; Sampson 1991; Volker and Flap 2007). Likewise, urban scholars have focused on the interplay between social networks and perceptions of collective efficacy might impact actual behavior in neighborhoods (Kleinhans and Bolt 2016). In this way, local social networks are presumed to impact not only in residents' perceptions, but also their participation in neighborhood voluntary associations (Hays 2016). Few studies have been able to disentangle the mechanisms of how personal networks relate to perceptions of collective efficacy, and we argue that existing research is limited due to a lack of consideration for 1) the *content* of personal network ties 2) the *spatial locations* of alters, and 3) the impact of the *geographic scale of settlement patterns*.[1]

Whereas neighborhood researchers typically focus only on socializing ties among

[1] Social network scholars define the person reporting on the network as an *ego*, and the persons they are tied to as *alters*.

residents (Kasarda and Janowitz 1974; Sampson 1988; Warner and Rountree 1997), which *may* be important for translating into collective efficacy, a novel contribution of this manuscript is utilizing the (etic[2]) notion of *neighborhood safety ties*: that is, the persons to whom residents report they would turn when confronted with problems in their neighborhood. We explore here their connection with perceptions of collective efficacy. Furthermore, existing literature typically asks only about the number of social ties a respondent has with others in the *local neighborhood*. Despite the likely importance of local ties, we argue that this should not be assumed. More distant ties might provide access to resources and information not available in the neighborhood (Bursik and Grasmick 1993; Sampson 2012). Whereas some scholars have argued that social ties can have a placeless quality to them (Wellman 1999) our focus is on how ties are formed by physical co-location, and the subsequent consequences for attitudes and perceptions of residents in a physical space.

We also examine the spatial scale of personal networks across urban and rural settlements. Although scholarship often focuses on urban or rural areas separately, with a presumption that social processes operate differently in each environment, the extent to which this is the case requires further empirical evidence. As one notable example, existing research typically presumes that social ties will impact perceived collective efficacy differently in urban versus small town rural environments (Fischer 1975; Wirth 1938). Studies focused on a single urban area cannot address this question, and we therefore use a single sample to assess whether the determinants of perceived collective efficacy are similar in rural versus urban areas.

We are interested in residents' perceptions of collective efficacy—rather than the level of

[2] As Krackhardt (Krackhardt 1992) has noted, the emphasis of most social network research on emically defined relations may obscure the relationships that are most critical for understanding social process; an etic definition of relationships that are theoretically important (even if they do not directly correspond to culturally defined ideal types) is hence a critical step for progress in the field.

collective efficacy in a neighborhood—and therefore we use a sample that does not draw a large number of respondents from each neighborhood, but rather selects respondents based on a uniform area sampling strategy, and therefore rarely obtains more than one person per neighborhood. Although this does not allow us to study neighborhood-level processes, it does provide us insight on the networks of respondents over a much broader array of neighborhoods in both urban and rural areas. Furthermore, the information on the spatial location of their social ties allows us to distinguish between neighborhood-based ties and other ties. Indeed, empirical evidence shows that there can be considerable disagreement among residents about the level of collective efficacy in their neighborhood (Browning, Dirlam, and Boettner 2016; Brunton-Smith, Sturgis, and Leckie 2018; Hipp, Williams, and Boessen 2018). In short, the micro-mechanisms between social ties and an individual's perception of collective efficacy occur at the individual level as the resident interacts with their social ties, which impacts their perceptions of collective efficacy.

To address these questions, the present study uses unique data on a spatially representative sample of residents of the Western United States. The data provide information on the spatial locations of residents as well as their social ties, and does so over a large region (allowing us to draw conclusions that are not biased by choice of a particular community). The survey also asked residents to report whether each tie was to someone in their "neighborhood." Whereas a common strategy in the existing literature only asks about social ties in the neighborhood (as defined by the respondent), we are able to assess the importance of ties external to this self-identified "neighborhood." Residents were asked about socializing ties, as well as our relatively novel contribution of neighborhood safety ties. Given that the study has large numbers of both rural and urban residents, we are able to directly assess whether

perceptions of collective efficacy play out differently in rural versus urban environments.

The Role of Social Ties and the Determinants of Collective Efficacy

Much of the theorizing about neighborhood processes and mechanisms emphasizes the importance of residents' social networks (Guest and Wierzbicki 1999). As one key strand of research, social disorganization theory posits that poverty, ethnic heterogeneity, and residential instability of neighborhoods creates fissures between residents and this leads to increases in crime and other neighborhood problems (Shaw and McKay 1942).[3] As an extension to their theory, Bursik and Grasmick's (1993) systemic theory posits that neighborhood processes are facilitated within the area due to residents' networks. In this view, the underpinnings for the potential of collective action in communities is developed and facilitated by residents' social networks (Entwisle, Faust, Rindfuss, and Kaneda 2007). Bursik and Grasmick also posited that the reach of residents' networks to other people and institutions outside of the neighborhood was important in that it provided access to information and resources external to the neighborhood.

Stemming from this line of work, collective efficacy is arguably the most significant contribution to the neighborhoods literature in the past two decades. Sampson and colleagues' work on collective efficacy as well as Mary Pattillo's work questions whether the presence of dense local ties is sufficient for community processes (Browning, Feinberg, and Dietz 2004; Pattillo 1998; Sampson 2012). Rather than relying exclusively on residents' social networks, Sampson and colleagues' (1997) seminal Chicago study on collective efficacy argues that it is residents' *perceptions* of social cohesion and a willingness for informal social control that drive

[3] Note that the emphasis on the role of ethnic heterogeneity and residential instability on tie formation processes is arguably quite similar to work in the social networks literature on homophily and propinquity (adams, Faust, and Lovasi 2012; McPherson, Smith-Lovin, and Cook 2001).

many neighborhood processes. Although most research focuses on the consequences of collective efficacy, some research explores the *determinants* of collective efficacy (Duncan et al. 2003; Rhineberger-Dunn and Carlson 2009; Wickes, Hipp, Sargeant, and Homel 2013). Sampson and colleagues' (1997) paper laid the initial groundwork in this area, exploring the determinants of perceived collective efficacy in Chicago and suggesting resident age, disadvantage, immigrant concentration, and residential stability as being associated with collective efficacy. Duncan et al. (2003) also found that perceived collective efficacy was significantly associated with age, marital status, and violent crime.

While much research has combined the two components of collective efficacy - cohesion and expectations of informal social control - into one general scale of perceived collective efficacy, some research suggests that this may be inappropriate: collective efficacy is based on task-specific behaviors whereas cohesion is a more general construct (Rhineberger-Dunn and Carlson 2009; Wickes, Hipp, Sargeant, and Homel 2013). Indeed a study of North Carolina neighborhoods found evidence that higher levels of cohesion were associated with higher levels of collective efficacy at the next time point (Hipp 2016). Likewise, a study of neighborhoods across ten cities found a similar effect (Collins, Neal, and Neal 2014), and in a follow-up study they found that this relationship was even stronger in racially homogeneous neighborhoods (Collins, Neal, and Neal 2017). A consequence is that the determinants of these two dimensions of collective efficacy may not always move together. For instance, residents may feel a sense of cohesion with their neighbors, but this does not necessarily imply that they or their neighbors would willingly get involved in addressing a neighborhood issue (Hipp 2016; Wickes, Hipp, Sargeant, and Homel 2013). Some research posits that residents may be unwilling to invoke informal social control because of a strong tie (Browning, Feinberg, and Dietz 2004; Pattillo

1998), but this does not necessarily imply that that they would not perceive cohesion in the local area. Thus, there is a need to examine the distinct subcomponents of collective efficacy as the role of social networks may operate differently depending on whether the focus is on residents' perception of cohesion or expectations of informal social control.

We also highlight that there is a literature focused on neighborhood attachment and neighborhood cohesion that sometimes conflates social networks with attachment or cohesion (Forrest and Kearns 2001). In these studies, social ties between residents are presumed to be desirable and foster a sense of attachment to the neighborhood. Accordingly, researchers sometimes include a measure of neighborhood social ties as a component of a general measure of cohesion or attachment. Nonetheless, we follow other scholars in positing that it is useful to distinguish between social ties and their possible consequences (Sampson 2006; Wickes, Hipp, Sargeant, and Homel 2013). Thus, whereas social ties indeed can induce a sense of attachment to the neighborhood, they need not always lead to such a perception. Therefore, it is useful to distinguish between the presence of social ties, and what they may be able to accomplish, including creating a sense of attachment to the neighborhood, or engendering a sense of collective efficacy on the part of residents.

Although scholars have posited that networks play a role in fostering cohesion or perceptions of willingness to intervene in neighborhoods (Sampson 2004), less consideration is given to *how* these ties might actually bring about such a change in perceptions. In this paper, we test if networks' consequences for the different components of collective efficacy depend on 1.) their content or 2.) their spatial distribution. We now turn to discussing these considerations.

Distinguishing tie content

Whereas the term "social ties" is often used in the neighborhoods literature as a unitary

phenomenon, social network researchers are aware that there are many types of social relations. That is, social ties can serve different functions (Wasserman and Faust 1994), whether as very close ties providing emotional attachment, casual socializing ties, or even just brief occasional conversations, etc. A consideration of relational content raises a question: what types of social ties among residents impact their perceptions of neighborhood collective efficacy? Although most research in this tradition has focused on socializing friendship ties, it is unclear whether these are the only, or even the primary, ties that bring about a sense of collective efficacy. In this study, we explore this possibility by explicitly capturing socializing ties as well as ties that residents would turn to if concerned about a neighborhood issue—an etically defined relation that we term *neighborhood safety ties*. We also posit that different contents of ties may have distinct consequences for the two components of collective efficacy.

Socializing ties

Systemic theory posits that more socializing ties in the neighborhood will bring about a stronger sense of cohesion among residents (Kasarda and Janowitz 1974). Scholarship has found that socializing in neighborhoods is positively related to residents' perceptions of collective efficacy in Chicago (Sampson and Raudenbush 1999) and in a national study (Carbone and McMillin 2019). Studies have also found that more socializing ties among neighbors are associated with greater attachment to the neighborhood (Connerly and Marans 1985). A study of residents in Brisbane neighborhoods found that more neighboring reported by residents was also positively related to neighborhood cohesion (Wickes, Hipp, Sargeant, and Homel 2013). Likewise, Almquist and Butts (2015) found that U.S. residents' sense of personal identification with a region was more strongly predicted by the number of personal ties to others in that region than by factors such as actually residing there.

Although socializing ties may directly affect the cohesion component of collective efficacy, there are mixed theoretical expectations for the relationship of socializing ties with the social control component of collective efficacy. On the one hand, some evidence finds that socializing ties can enhance informal social control, as research in Great Britain found a positive relationship between the proportion of social ties in the neighborhood and informal social control (Sampson and Groves 1989) and a study in Brisbane found that greater neighboring was positively related to perceptions of collective efficacy for three different tasks (Wickes, Hipp, Sargeant, and Homel 2013). On the other hand, scholars have pointed out that strong ties may impede social control if residents are obligated to sanction persons to whom they have personal relationships (Morenoff, Sampson, and Raudenbush 2001; Sampson 2004). Furthermore, the evidence that some neighborhoods with many network ties do not have high levels of collective efficacy is also evidence against the notion that socializing ties is a sufficient condition for it (Morenoff, Sampson, and Raudenbush 2001). Browning and colleagues (Browning, Feinberg, and Dietz 2004) posited the *negotiated coexistence* model to explain this pattern, in that social networks can also provide social capital between people who engage in delinquent activities, resulting in negative consequences for neighborhoods. Thus, there are competing hypotheses for the relationship between socializing ties and informal social control.

Neighborhood safety ties

Drawing from five years of qualitative data in Chicago, St. Jean (St. Jean 2007) shows that there is considerable variability among residents' perceptions of collective efficacy, and that perceptions of community action are largely unformed until the area has a common problem (St. Jean 2007). This work implies a question: If a resident observes crime or disorder problems in a neighborhood, what purpose will conversations with various ties play in activating a sense of

cohesion or informal social control? One purpose is to address the question of whether such an event signals an isolated incident, or is indicative of a larger pattern of possible change which can impact their assessment of neighborhood cohesion and collective efficacy (Hipp 2011). In seeking such information, a resident may reasonably canvass alters both in his or her own neighborhood and elsewhere, since the experiences of those in other locations may be useful in putting local events into perspective (Boessen, Hipp, Butts, Nagle, and Smith 2017). A second purpose is to obtain emotional support, e.g. to normalize the situation via discussion, to construct a frame in which to understand the event, or simply to obtain affective reinforcement (Warner and Rountree 1997). In this case, the resident would most likely turn to alters with whom he or she has stronger relationships, irrespective of distance. A third purpose is to obtain general information on action to take in response to the event, either individually or as a collective neighborhood response (Hays 2016). For this purpose, both near and distant alters may be useful (with those who are local having a better understanding of local conditions, and those elsewhere being more likely to have information not already known to the respondent). A fourth purpose is to provide information to others; this would seem typically to be most relevant to social ties in the same neighborhood. A fifth purpose would be to mobilize action (Sampson, McAdam, MacIndoe, and Weffer-Elizondo 2006). Typically, the ties useful for this purpose will be to others within the same neighborhood, since those who are far removed are unlikely to be willing or able to carry out sustained interventions in the respondent's area of residence.

Given these considerations, we argue that all of these purposes are folded together in a relationship that we term the *neighborhood safety tie* - an alter to whom ego would turn in order to help deal with a perceived threat to the safety of his or her neighborhood. Somewhat surprisingly, almost no research to date has examined ties that are explicitly related to addressing

a neighborhood problem, even though these are (by definition) likely to be the ties that residents would call upon to help address a particular issue. Although socializing ties are often a proxy for a variety of neighborhood processes, we propose that different ties may be used for different neighborhood processes. Whereas we noted in the prior section that socializing ties may be more likely to affect the cohesion in the neighborhood, we posit that to whom residents turn for neighborhood safety issues will have a stronger association with the informal social control component of collective efficacy. Given the different purposes that we just noted for responding to neighborhood problems, we argue that many of these purposes will entail neighborhood safety ties – ties with whom residents would primarily discuss issues ongoing in their local area. Socializing ties may also have a much broader spatial distribution than neighborhood safety ties in part because many friends are not constrained to the local neighborhood, but whom residents rely upon to solve a local neighborhood safety issue might be. This last point suggests a need to consider the spatial distribution of ties, an issue to which we now turn.

The Spatial Distribution of Social Ties

Although the advent of social media might lead one to presume that nearby social ties are less important, scholars nonetheless argue for the crucial role of geographic space for network processes (Butts, Acton, Hipp, and Nagle 2011; Small and Adler 2019; Wang, Lizardo, and Hachen 2021). Indeed, the vast majority of neighborhood-based research suggests that local social relationships are the basis for residents' perception of neighborhood cohesion or collective efficacy (Kleinhans and Bolt 2016; Sampson 1991; Wickes, Zahnow, Corcoran, and Hipp 2019). There is typically an implicit assumption in these studies that only neighborhood-based times matter. However, there is a body of research focused on how social media enables social ties to flourish that are not necessarily geographically bound (Wellman 1999). As one example, a study

of an online Facebook network found evidence of a community that developed based on positive interactions and support that even transcended national borders among participants (Vesselinov, Villamizar-Santamaría, Gomez, and Fernández 2019). Nonetheless, there is an awareness within this literature, and supporting empirical evidence, that these online ties can enhance interpersonal, in-person ties and therefore neighborhood cohesion (Hampton and Wellman 2003). Moreover, online ties themselves may still follow geographical and institutional boundaries, even for fairly well-resourced populations who might be expected to use online settings to maintain boundary-spanning relationships (Spiro, Almquist, and Butts 2016).

Given all this, there is uncertainty regarding the spatial pattern of social ties, and how they might impact residents' perceptions of cohesion or collective efficacy. One possibility is that a resident will intervene and turn to those with whom they are physically (and likely emotionally) closest, suggesting a very micro spatial process: perhaps even turning only to those living on the same street as posited by Taylor (1997). Alternately, if residents are more willing to intervene in areas where they have the most knowledge, investment, and awareness of different issues and people, ties from somewhat broader areas such as the local neighborhood may be used (Hipp and Boessen 2015; Reynald 2010). Whereas scholars in the criminology and urban sociology literature typically assume that social ties outside the neighborhood are not important, this may not be accurate given some of the literature noted in the prior paragraph.

Residents may feel more willing to intervene in the neighborhood if they have more support and information from a broader spatial area outside the neighborhood, which could come from long distance ties (Entwisle, Faust, Rindfuss, and Kaneda 2007), and external organizations (Bursik and Grasmick 1993). Conversely, another perspective is that the presence of ties outside the neighborhood might actually have a *negative* effect on perceived cohesion, as more distant

ties take time away from cultivating local ties (Bellair 1997; Boessen, Hipp, Smith, Butts, Nagle, and Almquist 2014). A study of residents in Dutch neighborhoods found that although residents with more socializing ties in the neighborhood reported a stronger sense of cohesion, those with fewer ties outside the neighborhood reported more cohesion with the neighborhood, suggesting a possible crowding out effect from more distant ties (Volker, Flap, and Lindenberg 2007). This all suggests that ties in the local nearby area may have beneficial consequences for perceptions of cohesion, but the role of more distant ties is unclear.

Researchers only occasionally formally measure the spatial location of residents' alters when considering how they are related to cohesion or collective efficacy, even though these relationships are expected to drive the mechanisms of "neighborhood effects" research (Entwisle, Faust, Rindfuss, and Kaneda 2007; Faust, Entwisle, Rindfuss, Walsh, and Sawangdeed 1999). This omission is understandable, given the difficulty and cost in collecting such data, limiting the number of available studies. At this same time, however, this lack of data is unfortunate given the long-running line of work showing the importance of physical distance for forming and maintaining social ties, and the general negative relationship between distance and tie probability (a phenomenon referred to as propinquity. Of those studies that are available, a common strategy is to measure the location of all residents in a single small community, along with the social ties amongst them. For example, a number of earlier studies in the mid-20th century focused on student housing communities and how physical distance impacted social tie formation (Caplow and Forman 1950; Festinger, Schachter, and Back 1950). Two more recent studies also collected information on where all residents lived in a few small communities, and assessed the extent to which propinquity impacted social tie formation even when accounting for various socio-demographic differences between residents (Grannis 2009; Hipp and Perrin 2009).

Likewise, studies have assessed the extent to which propinquity impacts social tie formation among adolescents (Mouw and Entwisle 2006; Quillian and Campbell 2003). Yet another study used information on social ties between adolescents, and where they live, to construct neighborhood boundaries based on these ties, and assess how these boundaries impacted residents' similarity in assessing the level of cohesion in their neighborhood (Hipp, Faris, and Boessen 2012). Other studies (e.g., Latané, Liu, Nowak, Bonevento, and Zheng 1995) capture egocentric information on the distance between individual respondents (egos) and those to whom they are tied (alters), but without explicit information on the exact ego or alter location needed for assessing neighborhood effects.

While this work has added to our understanding of propinquity, few studies have assessed how the spatial distribution of social ties is directly related to residents' perceptions of their neighborhoods. Two studies that we are aware of explicitly measured the spatial distribution of social ties and assessed the consequences for *attachment* to the neighborhood. A small-scale study of neighborhoods in two urban communities (13 census tracts total) in Southern California found that although the number of kin and socializing ties were not important, the number of neighborhood safety contacts and the number of persons with whom they discuss important matters had a positive relationship with neighborhood attachment (Boessen et al. 2014). A more recent large-scale study using the data we use here also focused on the attachment to the neighborhood and city among urban and rural respondents (Luo, Hipp, and Butts 2022). We extend these studies here by focusing on attitudes towards *collective efficacy*—both cohesion and perceived informal social control capability—rather than neighborhood attachment. We also explore the spatial distinction between urban and rural residents, an issue we discuss next.

The geographic scale of settlement patterns

A key question is whether social network position, or various demographic structural characteristics, have a similar impact on the development of collective efficacy depending on the geographic scale of settlement patterns, given the considerable differences between rural and urban environments (Fischer 1975; Wirth 1938). When considering the cohesion component of collective efficacy, there are competing theories regarding whether social networks will have different effects in urban versus rural settings. One view is that higher population density increases anonymity, and therefore reduces cohesiveness (Wirth 1938). An implication of so many potential nearby ties is that residents will possibly have more—but more fleeting—social ties, resulting in less cohesion (Mayhew, McPherson, Rotolo, and Smith-Lovin 1995). In another view, Fischer posited that population size and density in urban areas allows for stronger and more intense subcultures to develop (Fischer 1975). As a result, there is arguably a better chance of diffusion of information in larger urban areas rather than rural areas (Fischer 1978), and the implication is that cohesion more likely develops in urban areas (an effect also found in a simulation study of urban network structure by Butts, Acton, Hipp, and Nagle 2011). Other scholars posit that community size does not play a role in information diffusion but rather that the content of social ties is what matters, an issue that we noted earlier (Richardson, Erickson, and Nosanchuk 1979). And some research instead argues that social networks may be more crucial in rural areas due to the influence of religious institutions and the possibility that rural residents have more civic engagement (Lee and Bartkowski 2004). Thus, there are competing perspectives on how rural or urban settlement patterns shape the relationship between networks and perceptions of cohesion.

There are also competing theories regarding the impact of social networks on the informal social control component of collective efficacy in urban versus rural areas. In a dense

urban environment, residents can easily experience casual serendipitous interactions—unplanned interactions in which two persons simply cross paths in the environment—which may increase the informal social control capability. Such interactions are much less likely in a rural environment in which households are more spread out (Entwisle, Faust, Rindfuss, and Kaneda 2007). In contrast, although residents in urban areas may have more social ties than residents in rural areas simply due to propinquity, if encounters with strangers more strongly shape perceptions of cohesion, then high-density areas would be perceptually anomic (in that there are many people nearby to whom ego is not tied) (Butts, Acton, Hipp, and Nagle 2011). Finally, some research on crime patterns suggests a generality in the mechanisms of social ties which implies that the differences between urban and rural areas may be more slight than otherwise presumed (Osgood and Chambers 2000). In this view, there will be no differences observed between the rural and urban samples.

Current Study Overview

Using data from a large spatial network study of the entire Western United States, this study focuses on the role of social networks in explaining residents' perceptions of collective efficacy. Our focus is on individual perceptions of collective efficacy in part because these are the dimensions of the phenomenon for which measurements (along with measurements of key covariates) currently exist over a wide range of social and geographical settings, but also because individual perceptions form the basis of neighborhood perceptions. We have suggested that the content of social ties and spatial distribution of ties via distance in urban and rural settlement patterns might differentially affect the different determinants of collective efficacy. Our study time period is from 2010-12, and therefore we capture neighborhoods in the final stages, and aftermath, of the financial crisis and great recession in the U.S. that led to a large foreclosure

crisis that impacted many neighborhoods in a negative fashion. Although we know of no reason for this to impact the generalizability of our results, this setting may inform interpretations of the social milieu in which the study respondents were embedded.

Data and Methods

Data

This study uses data from the American Social Fabric Study (ASFS), a spatially stratified sample of adult, non-institutionalized residents of the western United States (Butts, Hipp, Nagle, Boessen, Acton, Marcum, and Lickfett 2014). The ASFS is a large-scale egocentric network survey (N = 3,637) with four component surveys collected from 2010-12: the Twin Communities Network Study (TCNS, N=273), Los Angeles Network Study (LA, N=220), Southern California Regional Network Study (CRS, N=1,105), and the Western United States Network Study (Western, N=2,039). The ASFP contains demographic and geographic information on both respondents (egos) and those to whom they are tied (alters). Subjects were recruited through postal mail inviting them to take a web-based survey along with a cash incentive and the sampling frame was constructed based on block groups or tracts, which were selected in a spatially uniform manner. The sampling design then selected respondents randomly from these tracts or block groups. As a consequence, there are very few instances in which we have more than one respondent in a tract. The respondent was asked to provide their address, which was located to the nearest block pair. If the address information was not provided, we would then locate the respondent to their sampling unit (either the block group or tract). The overall response rate was 19.3% for all surveys. Nonetheless, the sample generally reflected the age, race, and income composition of the surveyed tracts. There was a slight over-representation of

residents over 65 years of age, Latinos, and those with low income. We therefore include these measures in the models to account for any over-representation. The ASFS is distinctive in collecting information on multiple network relationships and the geographical location of social alters over a wide geographical area, providing a unique window into the connection between place, space, social structure, and residents' perceptions of their local community.

Given that the ASFP sample was selected proportional to area (with a supplemental urban population subsample in Los Angeles), we have relatively large sample sizes of both rural and urban residents. Although there are various ways to distinguish between rural and urban environments, a key criterion for nearly all strategies is the number of persons in the local environment. We therefore directly operationalize this based on the *population within 32 kilometers* (20 miles) of the resident's tract. A 32 kilometer distance was used given that about 75% of the U.S. population commutes this distance or less to work. We used a population cutoff of 50,000 because the Census defines this minimum city population size for the central city of a metropolitan area, and as the total maximum population for a micropolitan area. Thus, in our sample the average "urban" resident had 2.16 million people within 32 kilometers of them whereas the average "rural" resident had about 8,300.[4]

Dependent variables

Our dependent variables capture the two dimensions of collective efficacy as measured by Sampson and colleagues (Sampson, Raudenbush, and Earls 1997): *perceived neighborhood cohesion* and *perceived capacity for informal social control*.[5] Perceived neighborhood cohesion

[4] We also assessed whether there are differences among rural households by splitting out "pioneers"—those living in very sparse environments. This split was based on those with less than 5,000 persons within 32 kilometers, and those with between 5,000 and 50,000 within 32 kilometers. The results for these two subgroups were essentially identical.

[5] Although one can imagine behavioral measures related to collective efficacy, we follow Sampson and colleagues in defining collective efficacy per se to be an inherently perceptual phenomenon.

combines the responses to five questions each with a 5-point Likert scale ranging from strongly disagree to strongly agree, each asking "How strongly do you agree that…": 1) people in this neighborhood can be trusted?; 2) people in this neighborhood share the same values?; 3) this is a close-knit neighborhood?; 4) people around here are willing to help their neighbors?; 5) people in this neighborhood generally get along with each other? There is high reliability for these measures (α=.87). Perceived expected informal social control combines the responses to four questions asking "How likely is it that your neighbors would intervene if…": 1) children were skipping school and hanging out on a street corner?; 2) children were spray painting graffiti on a local building?; 3) a fight broke out in front of their house?; 4) children were showing disrespect to an adult? This also had high reliability (α=.85).[6] We model these two latent variables as separate constructs, following prior research showing they are conceptually and empirically distinct; indeed they were correlated just .66 and .63 in our urban and rural samples, respectively.

Independent variables

Our key independent variables capture personal ties of the respondents. The network elicitation component of the survey captured several types of ties. The first key measure employed in this paper captures *socializing ties*, and was based on the question (from Fischer, 1982): "Which of the following people do you engage in social activities with, such as going out for a meal, visiting, going out socially, etc.?" Respondents could list as many names as necessary. Our second key measure captures *neighborhood safety ties*, and was based on the question: "Imagine that you personally observed a crime or other event taking place near your

[6] These measures are based on the initial Sampson et al 1997 study. Nonetheless, we assessed whether the one measure that does not focus on social control of children is different than the others, based on the insight that collective efficacy is task-specific (Wickes, Hipp, Sargeant, and Homel 2013). Nonetheless, this measure never had the lowest loading in the confirmatory factor analyses. Furthermore, when we constructed factor scores either including or not including this measure, the correlations were .96 in the urban sample and .97 in the rural sample, indicating that this question does not capture a substantively different task for collective efficacy.

home which made you concerned about the safety of your neighborhood. Which of the following people would you seek to contact to discuss this issue?" Respondents could again list as many names as necessary (explicitly including persons nominated in response to earlier questions). Towards the end of the survey, respondents provided the address for each of the persons named in the network elicitation questions, and were asked to assess whether or not they are in their "neighborhood" (self-defined). With this information, along with the location of the respondent, we computed the distance between the respondent and each social tie. We constructed counts of 1) the *number of safety ties in the "neighborhood"*, 2) the *number of safety ties not in the "neighborhood"*, 3) the *number of socializing ties in the "neighborhood"* and 4) the *number of socializing ties not in the "neighborhood"* (excluding same-household ties for all measures). We also constructed a measure of the percent of socializing ties that are in-neighborhood, since this measure has been used in the literature (Sampson and Groves 1989). These measures do not account for the spatial location of alters, but mimic the typical strategy of allowing the respondent to define in-neighborhood ties.

We also tested the importance of nearby ties versus more distant ties by constructing spatially explicit measures of socializing or neighborhood safety ties. We constructed exponential decays for the presence of socializing or safety ties based on different values of β (Horner and Marion 2009):

$$Si = \sum_{j=1}^{J} Pjexp(-\beta dij)$$

where S is the distance-weighted number of safety or socializing ties, *j* represents person *i*'s social ties, P indicates if a safety ties exists with person *j*, d_{ij} is the distance from the respondent to the tie, and β is the chosen value. Note that each tie is weighted by this exponential decay function based on a particular value of β. We used a large number of values for β, ranging from -

.00001 to -5. Larger absolute values of β create a steeper distance decay. For example, when β is -.001, a tie 700 kilometers away has 50% the weight of a next door tie, whereas when β is -.1, a tie 7 kilometers away has 50% the weight of a next door tie. We also tested for a crowding out effect in which longer distance ties actually have a negative relationship with cohesion or expectations of informal social control by constructing a count of the number of socializing or safety ties more than 300 kilometers away and including this in the model along with the exponential decay measure.[7] We sequentially estimated models including the exponential decay measure based on the different beta values and selected the model with optimal fit based on the BIC value.

We also included several measures of the characteristics of respondents (egos in social network terminology) that might be related to perceptions of collective efficacy. We captured demographic characteristics with measures of *age*, gender (*male*), marital status (*married*), the *presence of children*, race/ethnicity (*Latino*, *Asian*, *Black*, *other race*, with *white* as the reference category), level of education, household income[8], *length of residence* in years, *frequency of church attendance*[9], number of organized group *meetings attend* (other than work) in the last month (log transformed due to a few extreme values).

We also included measures of the social environment of the local area nearby respondents' homes. To more precisely capture the social environment of the respondent we constructed these measures in egohoods—a buffer around the respondent containing all blocks within 1.6 kilometers (1 mile) (Hipp and Boessen 2013). For respondents who did not provide

[7] We alternatively constructed variables capturing the number of ties more than 50, 100, or 150 kilometers away, and the results were the same as those presented.
[8] The education and income measures were based on the 16 categories used by the U.S. Census.
[9] The response categories were: 1) never; 2) a few times a year; 3) several times a year; 4) once or twice a month; 5) almost every week; 6) once a week; 7) more than once a week.

us their address, we used the center point of their tract or block group to construct the egohood. These measures were constructed from the American Community Survey 5-year estimates for 2008-12 (the period overlapping data collection) and the 2010 Census.[10] We capture the economic resources in the neighborhood with a measure of *average household income*. We accounted for the effect of *income inequality* in the neighborhood with the standard deviation of logged household income (from binned income data). We measure *racial/ethnic heterogeneity* with the Herfindahl index of five racial/ethnic groupings (white, African American, Latino, Asian, and other race). We measure residential stability with the *average length of residence*. Finally, we measure the population within the egohood (implicitly *population density* given the constant size of egohoods) as well as the broader scale as the *population within 32 kilometers* of the resident.

Table 1 displays the summary statistics for the variables in the analyses. Given that our two outcome measures were latent variables, we computed factor scores based on the latent variables of perceived cohesion and perceived informal social control capability, and we see that they are slightly higher in the rural sample compared to the urban sample. Residents on average have more socializing ties in the rural sample compared to the urban sample (1.4 vs. 1 in the "neighborhood", and 4.6 vs. 4.3 not in the neighborhood) and more neighborhood safety ties (1.7 vs. 1.2 in the "neighborhood" and 1.4 vs. 1.2 not in the neighborhood). The demographic characteristics of the two subsamples are relatively similar, although more racial/ethnic minorities are present in the urban sample compared to the rural sample, they are higher SES,

[10] For variables available in blocks in the Census, it is straightforward to aggregate them to egohoods. For variables only available at larger units of block groups or tracts from the ACS, we first imputed these values to blocks based on the synthetic estimation for ecological inference approach. This strategy combines an imputation model at the larger geographic unit with block level data to impute values from the larger units to the blocks (Boessen and Hipp 2015). Variables used in the imputation model were: percent owners, racial composition, percent divorced households, percent households with children, percent vacant units, population density, and age structure (percent aged: 0-4, 5-14, 15-19, 20-24, 25-29, 30-44, 45-64, 65 and up, with age 15-19 as the reference category).

and their neighborhoods are more racially heterogeneous with higher average income.

<<<Table 1 about here>>>

Methods

We estimated structural equation models with the latent variables of cohesion and expected informal social control as the outcome variables using Stata 15.1. Given the sampling strategy, and that our data is in egohoods, there is very little nesting. We nonetheless estimated robust standard errors based on census tracts to account for any clustering. We first begin by exploring the overlap of neighborhood safety ties with other contents of ties, as well as their spatial distribution across various distance thresholds. We then turn to our models that examine the consequences of these patterns for perceptions of cohesion and informal social control. We assess these patterns by splitting the sample by urban and rural respondents.

Results

Spatial distribution of safety and socializing ties

We begin by describing the degree of overlap between neighborhood safety ties and socializing ties. Whereas 37% of socializing ties are also neighborhood safety ties, fully 70% of neighborhood safety ties are socializing ties. Thus, neighborhood safety ties tend to be a subset of socializing ties, rather than the reverse. Nonetheless, it is worth noting that 30% of neighborhood safety ties *are not* socializing ties.[11] Thus, the presumption that residents only turn to friends in the same neighborhood for discussing safety issues is not accurate.

We next ask about the spatial distribution of socializing ties and safety ties, and whether the respondent reported them being in their "neighborhood" or not. Figure 1 plots the mean

[11] Although we only focus on social ties outside the household, respondents were also allowed to nominate in-household ties. Interestingly, 23% of neighborhood safety ties are in the same household, highlighting that residents do not only turn to those outside the home for discussing crime problems. And whereas residents will turn to 31% of their kin ties to discuss crime problems, about half of their neighborhood safety ties are kin.

number of safety alters in or not in the neighborhood per kilometer within moving average distance bands based on logged distance in kilometers with intervals of .5 and incremented by .1 for the rural and urban portions of our sample (thus, ranges of 0 to.5 logged kilometers, .1 to .6 logged kilometers, .2 to .7 logged kilometers, etc). For the urban sample, we see a strong spatial decay in the number of safety alters in the neighborhood per kilometer (the solid red line in Figure 1). This steady decay results in extremely few safety ties in the neighborhood beyond about 25 kilometers (15 miles). The number of safety ties not in the neighborhood (the purple line) remains at a low level up through about 25 kilometers. The pattern is similar in the rural sample for safety ties in the "neighborhood" (the blue dashed line), and this also decays away at about 25 kilometers. Thus, in both urban and rural samples, there are relatively similar spatial patterns regarding who people turn to when discussing nearby crime problems.

<<<Figure 1 about here>>>

The pattern for socializing ties displayed in Figure 2 shows some differences compared to the pattern for safety ties. First, the decay function is less steep for socializing ties compared to neighborhood safety ties for both the urban and rural samples. In the urban sample, whereas socializing ties in the "neighborhood" (the red line) decay at a similar rate as safety ties, there are quite a few socializing ties not in the "neighborhood" (the purple line) that do not decay until nearer to 90 kilometers. In the rural sample, the decay pattern for socializing ties in the "neighborhood" (the blue dashed line) is similar to the urban sample, there are even more non-neighborhood socializing ties in the rural sample.

<<<Figure 2 about here>>>

Cohesion and informal social control models

We next turn to our models in which perceived cohesion and perceived informal social

control capability are the outcomes, and begin with the results for the urban sample. All models in Table 2 include all of the control variables. The first model includes the number of socializing ties in the neighborhood (as assessed and reported by the respondent). This is a common measure used in the literature, and we see a positive relationship with the cohesion outcome in the top panel, and the expectations of informal social control outcome in the bottom panel. Residents who report that they have more socializing ties in their "neighborhood" report greater levels of perceived cohesion (b=.0392, $p < .01$) and informal social control capability (b=.0393, $p < .01$). To get a sense of the magnitude of these effects, the standardized coefficients indicate that a one standard deviation increase in socializing ties is associated with .11 standard deviations greater cohesion and .08 standard deviations greater informal social control capability (β=.11 and β=.08). Model 2 tests whether socializing ties that are not in the respondent's "neighborhood" also impact these outcome measures, and we see evidence that they do (despite the fact that they are typically ignored in the literature). While the coefficients for these "outside neighborhood" socializing ties are smaller than the "neighborhood" ties, they nonetheless are significantly associated with cohesion (b=.0131, $p < .01$, $\beta = .10$). Model 3 uses the measure of the percent of socializing ties that are reported to be in the "neighborhood", and while this measure is also positively associated with cohesion, the R-square is somewhat lower than model 1 that used the count of socializing ties in the neighborhood. For the outcome of expected informal social control, it does just as good a job predicting this outcome as did the count of the number of these ties in model 1.

<<<Table 2 about here>>>

In model 4 of Table 2 we instead include our measure of the number of safety ties that the respondent reported as being in the neighborhood, and find that it has a robust positive

relationship with both outcomes. The magnitudes of these coefficients are 50-70% larger than those for the socializing ties in the first model (b=.0665, $p < .01$; b=.0603, $p < .01$). A one standard deviation increase in safety ties is associated with .19 standard deviations greater cohesion and .13 standard deviations greater expectations of informal social control. Furthermore, the variance explained increased notably in these equations, especially for the outcome of cohesion. To assess the relative importance of socializing and safety ties, we estimated an ancillary model including both measures simultaneously. We found that the safety tie measure remained relatively unchanged with similar magnitude, whereas the socializing ties measure was not statistically significant. Thus, it appears that the social relationship of a tie is important for fostering perceived cohesion and perceptions of informal social control capability: simply socializing with fellow residents is not enough to foster such attitudes. In model 5 we included the number of safety ties outside the neighborhood, and it was not statistically significant in these equations. Thus, safety ties that respondents believe are part of their own "neighborhood" are generally the ties of importance.

In model 6 we explicitly account for the spatial distribution of the safety ties, and we find that the exponential decay with a $\beta = -.05$ showed the strongest relationships with these outcomes in the urban sample. There is a strong positive relationship between this measure and both outcomes. Furthermore, there is no evidence of a crowding out effect from more distant safety alters as the coefficients for long distance ties (greater than 300km.) are close to zero. We plot this functional form when $\beta = -.05$ in Figure 3 (the solid blue line, which has the steepest decay in this figure). With this functional form, a neighborhood safety alter 14 kilometers away has 50% the value of a next door safety alter. Thus, more distant safety alters have a nontrivial relationship with perceived cohesion and expectations of informal social control. Clearly, safety

ties beyond the local neighborhood have a very substantial impact on residents' sense of cohesion and informal social control capability. In ancillary models we also included the spatial decay measure of socializing ties, and this measure was nonsignificant and the significance of neighborhood safety ties remained unchanged.

<<<Figure 3 about here>>>

Turning to the results for the rural sample, shown in Table 3, the results are very similar to the urban sample. One of the few differences is that the optimal beta for the distance decay (β = -.005) is less steep than for the urban sample, as seen in the green dotted line in Figure 3. A neighborhood safety alter 140 kilometers away from the respondent still has 50% of the impact on perceived cohesion or expectations of informal social control as a next door safety alter. Nonetheless, the pattern of results was the same, and we tested and found no evidence of significant difference in the safety ties measures across rural and urban samples.[12] These results are consistent with the observations of Smith and colleagues (Smith, Butts, Marcum, Hipp, Almquist, Nagle, and Boessen 2015) regarding similarity between rural and urban samples in personal network structure over the life course. Thus, despite the presumption of some that there would be sharp differences in the consequences of these safety ties, and their spatial distribution, across the urban and rural samples this was simply not the case.

<<<Table 3 about here>>>

Environment measures

We briefly consider the coefficients for the structural neighborhood environment measures in these models. Table A1 in the Appendix presents the full results from the model 6 estimates from Tables 2 and 3 for the urban and rural samples, and we see that average income

[12] This was assessed by estimating multiple group models and constraining the coefficients to be equal and comparing the chi square and BIC values across models.

has a strong positive relationship with both outcome measures in the urban sample, but has no relationship in the rural sample. This is consistent with the rising levels of economic segregation in urban areas in recent decades, particularly among higher income residents (Reardon and Bischoff 2011). Another sharp difference across samples is that higher levels of neighborhood racial/ethnic heterogeneity in the rural sample are associated with considerably reduced perceived cohesion and informal social control, whereas this ecological effect is not present in the urban sample.[13] Whereas Collins and colleagues (2017) found that racial heterogeneity negatively impacted collective efficacy in a study of fewer neighborhoods, our results are consistent with evidence of positive consequences in neighborhoods with persistent racial diversity in urban areas (Hipp and Kim 2022). Residents in more residentially stable urban neighborhoods report lower levels of perceived informal social control capability, which is opposite expectations (Sharkey 2013). And as the population increases within 20 miles, there are lower levels of perceived cohesion and informal social control in both the rural and urban samples.

Individual demographic measures

Among the individual measures, it is interesting to note that we find only modest differences between the urban and rural samples. Instead, many of the results are quite similar over both rural and urban environments. For example, those who are older perceive more cohesion, regardless whether they live in urban or rural environments. Asians report less informal social control. Those with higher household income report more cohesion and informal social control. Those who attend church more frequently report more cohesion in their neighborhoods. Only two significant differences at the individual level were observed across

[13] We assessed statistical significance of these differences across urban and rural samples by constraining coefficients equal in the multiple groups models and testing differences.

rural and urban samples. First, residents who attend church more frequently perceive more informal social control capability in the urban sample, but no such difference occurs in the rural sample (Warner and Konkel 2019). Second, the positive relationships between more frequent meeting attendance and perceived cohesion or informal social control capability are only present in the rural sample.

Conclusion

This study has explored the relationship between the spatial distribution of social ties and residents' perceptions of cohesion and informal social control capability (collective efficacy). The study makes three key contributions. First, rather than simply focusing on socializing friendship ties, we explored the consequences of a novel network tie type—neighborhood safety ties—and found that they exhibit much stronger relationships with both cohesion and informal social control capability compared to socializing ties. Thus, considering the *content* of ties is important. Second, we showed that the traditional strategy of allowing respondents to only report social ties that they consider are in their "neighborhood" misses important ties. Relatedly, we explicitly considered the spatial distribution of these ties. Existing research typically only focuses on the presence of ties to alters within the neighborhood—however defined—or else compares the presence of ties to alters within the neighborhood versus outside the neighborhood. We explicitly measured the distance to such alters to empirically assess the relative importance of short-range versus long-distance ties. Third, we utilized a spatially stratified sample that allowed us to compare these relationships in urban areas versus rural areas. It is notable that not only did many of the individual- and neighborhood-level measures have surprisingly similar consequences for cohesion and informal social control capability across rural and urban

environments, but the importance of neighborhood safety ties based on their spatial location was surprisingly similar across both urban and rural environments.

We emphasize that a contribution of our study was to move beyond existing research that only focuses on socializing ties, and we showed that the novel measure of neighborhood safety ties showed consistently stronger effects that were quite pronounced. As our measure was expressly designed to tap into the ties a respondent would turn to when confronted with a nearby crime or other event posing a threat to the safety of his or her neighborhood, it translates more directly into the social relationships that impact the perceived informal social control component of collective efficacy. It seems reasonable to presume that a resident who has more persons to turn to in such instances will perceive more ability of the neighborhood to enact informal social control. Indeed, this novel measure was positively associated with collective efficacy perceptions. However, it was less anticipated that these neighborhood safety ties would also be more likely to translate into higher perceived cohesion compared to socializing ties, and yet that is precisely what we found. This suggests that these neighborhood safety ties are an important contribution to the literature and future researchers will want to further explore their impact.

We found key consequences from the spatial distribution of social ties. On the one hand, it does appear that in urban environments the presence of more local ties—especially neighborhood safety ties—is more strongly related to perceived cohesion and perceived informal social control capability. Thus, the focus on neighborhood ties in prior research is not entirely unjustified. On the other hand, the presence of more distant social alters appears important as well. There is no evidence that they have a negative effect on residents' sense of cohesion or informal social control capability, which is the presumption of existing research that assesses the proportion of local alters among all alters to whom ego is tied. Furthermore, there was evidence

that more distant safety alters can actually *increase* residents' sense of cohesion and informal social control capability—an effect that could not be detected in prior research that exclusively focused on local ties. Although the distance decay effect was steeper in the urban sample than in the rural sample, it was nonetheless the case that more distant alters were clearly important for residents when forming their assessments of neighborhood cohesion or informal social control capability. These ties may be providing linkages to resources available in the broader community, which then increases a sense of the efficacy of the neighborhood.

Nonetheless, from a practical standpoint, we found that allowing residents to self-define which of their safety ties are in their "neighborhood" yields a quite effective measure. Presumably, a safety tie that the respondent perceives is in his/her neighborhood is different from those not perceived as in the neighborhood, and residents therefore find these to be quite important regardless of how far away they actually are. Thus, asking residents to report how many safety ties are in their "neighborhood", and allowing them to define the neighborhood, produces results that are just as strong at predicting collective efficacy as asking respondents how far away these ties are located. There appears to be something about the *perception* that a tie is in one's neighborhood that is important, and this argues *against* the researcher specifically defining the neighborhood for the survey respondent.

It was notable that the impact of the spatial distribution of neighborhood safety ties on perceived cohesion and informal social control capability operate somewhat similarly across rural and urban environments. This is an interesting finding given that scholars have long posited that urban environments operate in a fundamentally different fashion from small towns and rural environments (Fischer 1975; Wirth 1938). Furthermore, many of the coefficients were extremely similar across samples, highlighting that despite some differences in the spatial pattern

of social ties across urban and rural environments, their consequences for collective efficacy appear quite similar.

We note some limitations to this study. First, the cross-sectional nature of the data precludes making causal claims. Given that scholars have not considered neighborhood safety ties, nor their spatial distribution, our interest was in describing the patterns observed in these measures at a single point in time. Second, while distinguishing between rural and urban environments is always difficult given the lack of a consensus regarding definitions of these two concepts, our results appeared robust to using other threshold values for splitting the sample. Third, the response rate of just about 20% is a limitation. While this rate is within the range frequently encountered in postal recruitment surveys (Martha, Joanne, Manori, and Karin 2012; Webborn, McKenna, Elam, Anderson, Cooper, and Oreszczyn 2022), and our sample shows minimal evidence of bias compared to the sampling frame from which it was drawn based on demographic measures, it is never possible to entirely rule out self-selection effects. Fourth, we did not have a neighborhood-based sample, and therefore cannot assess the extent to which these individual-level perceptions we detected translate into neighborhood-level cohesion or informal social control. But given that studies use similar measures for assessing collective efficacy (Sampson et al 1997), our results would be expected to directly translate to neighborhood-level constructs given our random sample. Future research will want to incorporate neighborhood safety ties into neighborhood-based studies.

As a final limitation, four of our five questions asking about collective efficacy were focused on efficacy regarding children's behavior. Although this mimics how scholars have generally measured collective efficacy, the task-specific nature of collective efficacy (Hipp 2016: 33) implies that the spatial dimension of social ties may have different consequences regarding

other tasks not related to children. Nonetheless, it is notable that a study finding empirical evidence that certain types of residents can have systematically different levels of collective efficacy between distinct tasks related to children, violence, or political engagement (Wickes, Hipp, Sargeant, and Homel 2013), this same study found that the presence of more social ties to fellow residents—both at the individual- and the neighborhood-level—were consistently associated with greater collective efficacy for all three tasks. Whether the same similarity in empirical results would occur regarding the relationship between spatial networks and various tasks is an open question we leave to future research.

In conclusion, this study has highlighted the importance of considering the content and spatial distribution of social ties when considering how they relate to residents' sense of perceived cohesion and informal social control capability. We showed that neighborhood safety ties—a novel content of tie that captured the persons that residents would turn to if they observed crime events near their home—were positively related to residents' sense of collective efficacy in the neighborhood. This study also highlighted that it is important to consider the spatial distribution of social ties in general, and showed that neighborhood safety ties beyond the local area can have important consequences, especially in rural environments. Safety ties in the broader area even 80 kilometers away increased collective efficacy, which may be because they provide information and support on how to access resources in broader community, as well as direct access to these resources. We believe that neighborhood safety ties are an important type of tie that should be considered in future research exploring how neighborhood networks can translate into perceptions of collective efficacy.

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Tables

Table 1. Summary statistics of variables used in analyses

	Urban sample			Rural sample	
	Mean	SD		Mean	SD
Dependent variables					
Perceived cohesion	3.6	0.7		3.8	0.8
Perceived informal social control	3.7	1.1		4.0	1.0
Network variables					
Safety ties in neighborhood degree	1.2	2.1		1.7	2.7
Safety ties not in neighborhood degree	1.2	2.2		1.4	2.3
Socializing ties in neighborhood degree	1.0	2.1		1.4	2.6
Socializing ties not in neighborhood degree	4.3	5.6		4.6	5.4
Percent socializing ties in neighborhood	17.6%	29.7%		21.8%	31.3%
Safety ties exp decay (beta = -.05)	1.2	2.0			
Safety ties exp decay (beta = -.005)				1.9	2.9
Safety ties more than 300 km	0.29	0.85		0.36	1.03
Individual demographic variables					
Age	53.2	15.9		54.8	15.4
Male	56.5%			54.8%	
Married	62.2%			66.4%	
Presence of children	34.2%			29.2%	
Latino	19.4%			10.7%	
Asian	10.4%			0.9%	
Black	2.6%			1.3%	
Other race	2.6%			2.9%	
Education level	11.7	2.4		11.3	2.2
Income ($1000s)	79.7	68.0		58.0	49.2
Length of residence	11.9	11.0		13.0	12.4
Church attendance	2.02	2.17		1.98	2.19
Meetings attend (logged)	0.61	0.76		0.64	0.77
Environment variables (1 mile egohoods)					
Average household income ($1,000s)	87.52	40.49		62.00	27.58
Income inequality	0.88	0.12		0.84	0.13
Racial/ethnic heterogeneity	0.43	0.18		0.28	0.21
Average length of residence	9.6	3.0		10.4	4.6
Population (Thousands)	4.8	6.3		0.14	0.38
Population within 20 miles (millions)	2.16	2.39		0.01	0.01
N	1,324			2,217	

Note: perceived cohesion and perceived informal social control are reported as means of the questions in the scale. The analyses use latent variables based on these questions.

Table 2. Models predicting collective efficacy (cohesion and expected informal social control) for urban sample

	(1)		(2)		(3)		(4)		(5)		(6)	
Outcome: Cohesion												
Number of socializing ties in neighborhood	0.0392	**	0.0342	**								
	(3.92)		(3.41)									
Number of socializing ties outside neighborhood			0.0131	**								
			(3.38)									
Percent socializing ties in neighborhood					0.1978	**						
					(2.86)							
Number of safety ties in neighborhood							0.0665	**	0.0647	**		
							(6.80)		(6.61)			
Number of safety ties outside neighborhood									0.0174	†		
									(1.86)			
Exponential decay of safety ties (beta = -.05)											0.0684	**
											(6.54)	
Safety ties more than 300 km											0.0300	
											(1.26)	
R-square	0.152		0.160		0.146		0.175		0.177		0.174	
Outcome: Expected informal social control												
Number of socializing ties in neighborhood	0.0393	**	0.0356	*								
	(2.79)		(2.50)									
Number of socializing ties outside neighborhood			0.0098	†								
			(1.78)									
Percent socializing ties in neighborhood					0.307	**						
					(3.11)							
Number of safety ties in neighborhood							0.0603	**	0.0588	**		
							(4.33)		(4.21)			
Number of safety ties outside neighborhood									0.0147			
									(1.11)			
Exponential decay of safety ties (beta = -.05)											0.057	**
											(3.84)	
Safety ties more than 300 km											0.04	
											(1.18)	
R-square	0.154		0.156		0.155		0.162		0.163		0.160	

*Note: ** p < .01; * p < .05; † p < .10. T-values in parentheses. All models control for the following individual-level measures: age, male, married, presence of children, Latino, Asian, Black, other race, education level, income, length of residence, and meetings attend (logged). All models control for the following tract-level measures: average household income, income inequality, racial/ethnic heterogeneity, average length of residence, population within 1 mile, and population within 20 miles.*

Table 3. Models predicting collective efficacy (cohesion and expected informal social control) for rural sample

	(1)		(2)		(3)		(4)		(5)		(6)	
Outcome: Cohesion												
Number of socializing ties in neighborhood	0.0362	**	0.0330	**								
	(5.36)		(4.79)									
Number of socializing ties outside neighborhood			0.0078	*								
			(2.25)									
Percent socializing ties in neighborhood					0.1988	**						
					(3.54)							
Number of safety ties in neighborhood							0.0460	**	0.0448	**		
							(6.90)		(6.69)			
Number of safety ties outside neighborhood									0.0126			
									(1.64)			
Exponential decay of safety ties (beta = -.005)											0.0377	**
											(6.19)	
Safety ties more than 300 km											0.0061	
											(0.36)	
R-square	0.107		0.110		0.100		0.116		0.117		0.112	
Outcome: Expected informal social control												
Number of socializing ties in neighborhood	0.0409	**	0.0367	**								
	(4.25)		(3.75)									
Number of socializing ties outside neighborhood			0.0103	*								
			(2.08)									
Percent socializing ties in neighborhood					0.288	**						
					(3.57)							
Number of safety ties in neighborhood							0.0615	**	0.0598	**		
							(6.50)		(6.29)			
Number of safety ties outside neighborhood									0.0186	†		
									(1.72)			
Exponential decay of safety ties (beta = -.005)											0.052	**
											(6.06)	
Safety ties more than 300 km											-0.008	
											-(0.35)	
R-square	0.065		0.068		0.063		0.078		0.080		0.075	

*Note: ** $p < .01$; * $p < .05$; † $p < .10$. T-values in parentheses. All models control for the following individual-level measures: age, male, married, presence of children, Latino, Asian, Black, other race, education level, income, length of residence, and meetings attend (logged). All models control for the following tract-level measures: average household income, income inequality, racial/ethnic heterogeneity, average length of residence, population within 1 mile, and population within 20 miles.*

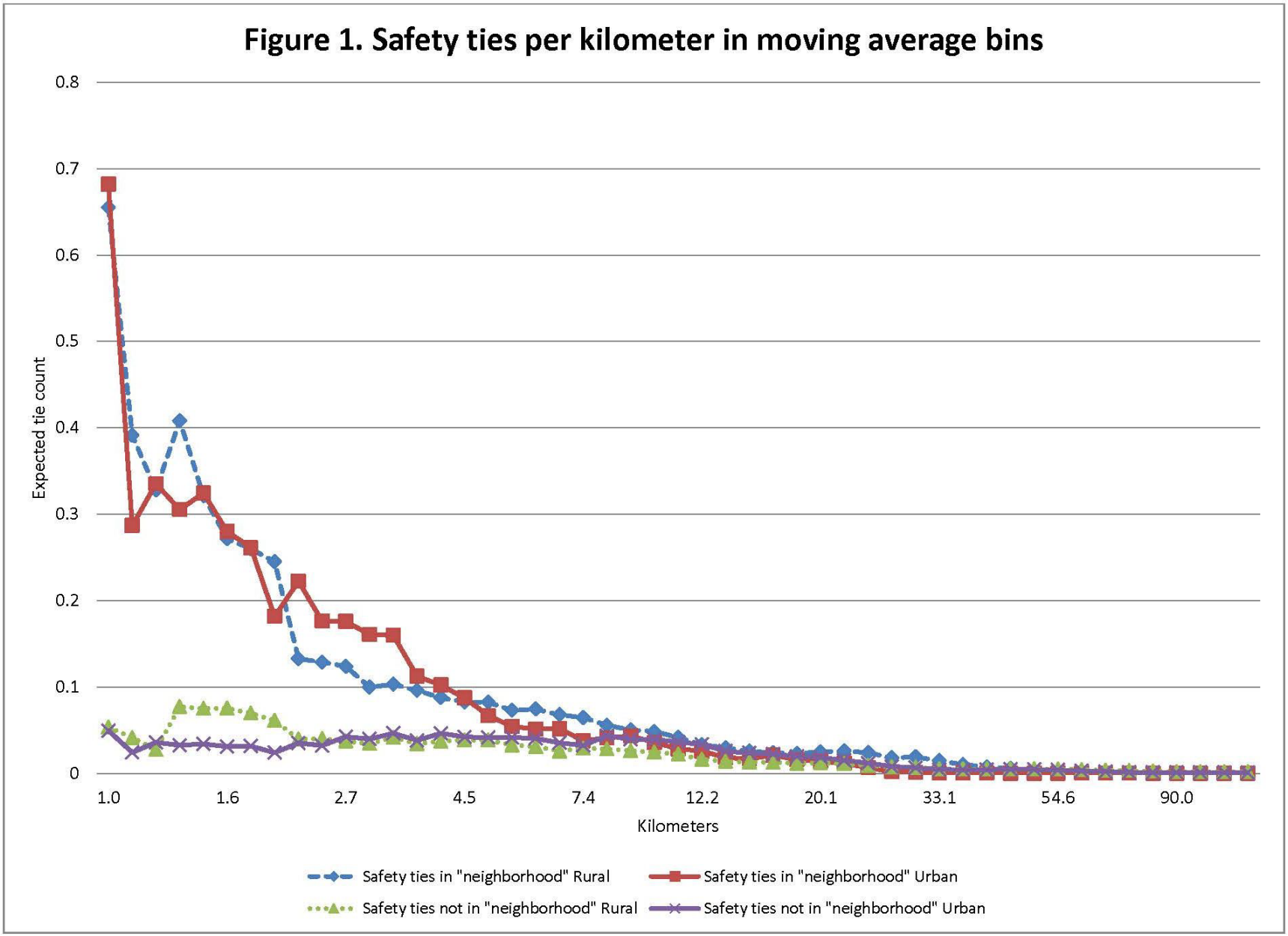
Figure 1. Safety ties per kilometer in moving average bins
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Expected tie count
1.0
1.6
2.7
4.5
7.4
12.2
20.1
33.1
54.6
90.0
Kilometers
Safety ties in "neighborhood" Rural
Safety ties in "neighborhood" Urban
Safety ties not in "neighborhood" Rural
Safety ties not in "neighborhood" Urban

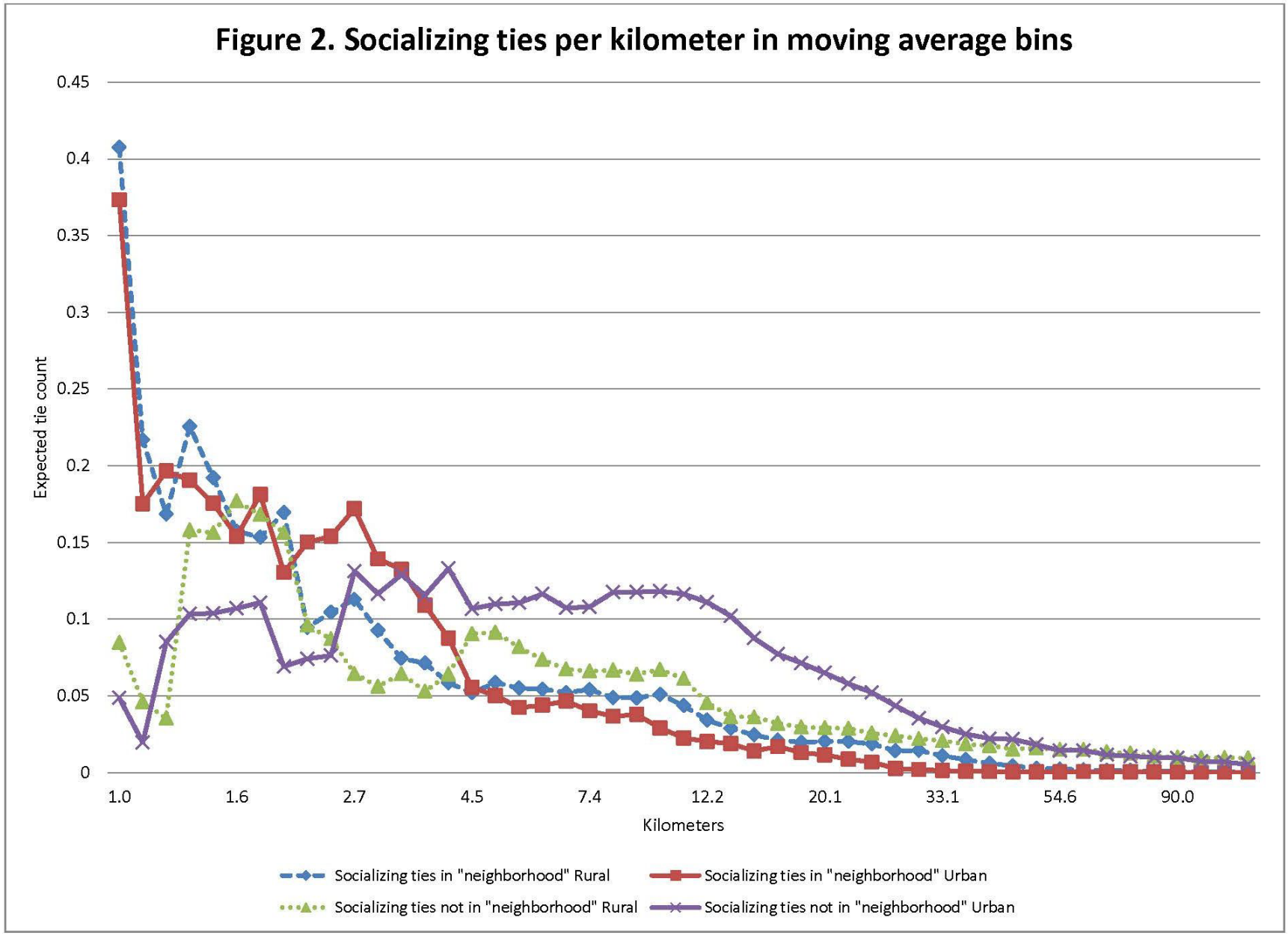
Figure 2. Socializing ties per kilometer in moving average bins
0.45
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Expected tie count
1.0
1.6
2.7
4.5
7.4
12.2
20.1
33.1
54.6
90.0
Kilometers
Socializing ties in "neighborhood" Rural
Socializing ties in "neighborhood" Urban
Socializing ties not in "neighborhood" Rural
Socializing ties not in "neighborhood" Urban

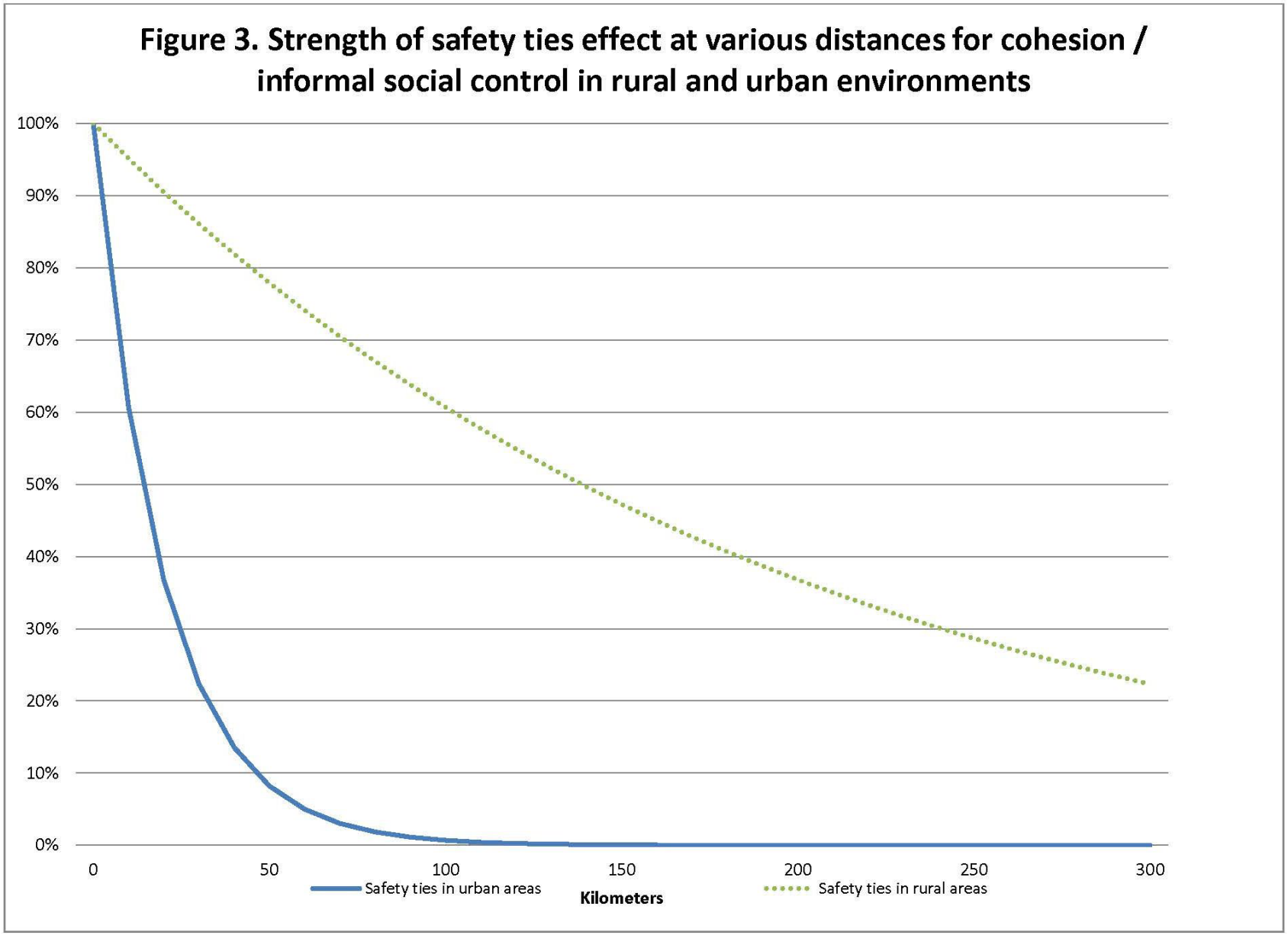
Figure 3. Strength of safety ties effect at various distances for cohesion / informal social control in rural and urban environments
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0
50
100
150
200
250
300
Safety ties in urban areas
Kilometers
Safety ties in rural areas

Table A1. Models predicting collective efficacy (cohesion and expected informal social control): complete results from model 6 in both Table 2 and Table 3

	Cohesion				Expected informal social control			
	Urban		Rural		Urban		Rural	
Neighborhood safety ties								
Exponential decay of safety ties	0.0684	**	0.0377	**	0.0574	**	0.052	**
	(6.55)		(6.19)		(3.86)		(6.03)	
Safety ties more than 300 km	0.0297		0.0062		0.0335		-0.0051	
	(1.25)		(0.37)		(0.99)		-(0.22)	
Individual demographic variables								
Age	0.0053	**	0.0045	**	0.0023		-0.001	
	(3.30)		(2.99)		(0.99)		-(0.44)	
Male	0.0226		0.0834	*	-0.0158		0.0183	
	(0.52)		(2.31)		-(0.26)		(0.35)	
Married	0.0360		0.1209	**	0.0746		0.1674	**
	(0.75)		(3.03)		(1.07)		(2.92)	
Presence of children	0.0445		0.0361		0.0537		0.0462	
	(0.90)		(0.75)		(0.76)		(0.67)	
Latino	-0.0463		-0.0838		-0.0548		-0.1206	
	-(0.76)		-(1.33)		-(0.62)		-(1.33)	
Asian	-0.0522		-0.2810		-0.4252	**	-0.5007	†
	-(0.72)		-(1.54)		-(4.02)		-(1.87)	
Black	-0.1615		-0.3137	*	-0.0499		-0.1961	
	-(1.24)		-(2.01)		-(0.26)		-(0.89)	
Other race	0.0833		0.0418		0.196		0.043	
	(0.65)		(0.39)		(1.06)		(0.28)	
Education level	0.0108		-0.0083		0.0105		0.0019	
	(1.11)		-(0.95)		(0.74)		(0.15)	
Income	0.0010	**	0.0007	†	0.0018	**	0.0012	*
	(2.80)		(1.71)		(3.50)		(2.11)	
Length of residence	0.0009		0.0021		0.0024		-0.0024	
	(0.43)		(1.32)		(0.80)		-(1.04)	
Church attendance	0.0475	**	0.0303	**	0.0493	**	-0.0037	
	(4.66)		(3.46)		(3.35)		-(0.30)	

Meetings attend (logged)	-0.0252			0.0651	*		0.0107			0.1244	**
	-(0.87)			(2.57)			(0.26)			(3.39)	
Environment variables (1 mile egohoods)											
Average household income	1.9364	**		-0.0153			3.6168	**		-0.7158	
	(3.56)			-(0.02)			(4.58)			-(0.78)	
Income inequality	0.0734			-0.0303			-0.1438			-0.0697	
	(0.42)			-(0.23)			-(0.58)			-(0.37)	
Racial/ethnic heterogeneity	-0.0656			-0.4004	**		0.1164			-0.4028	**
	-(0.51)			-(4.52)			(0.62)			-(3.17)	
Average length of residence	-0.0137	†		0.0043			-0.0239	*		0.0031	
	-(1.93)			(1.05)			-(2.34)			(0.54)	
Population density	-0.0113	*		-0.0306			0.0075			-0.0036	
	-(1.97)			-(0.63)			(0.91)			-(0.05)	
Population within 20 miles (millions)	-0.0254			-5.4706	**		-0.0848	**		-8.5656	**
	-(1.64)			-(2.83)			-(3.73)			-(3.11)	
R-square	0.174			0.112			0.160			0.075	

*Note: ** p < .01; * p < .05; † p < .10. T-values in parentheses.*