

Rural Community Participation, Social Networks, and Broadband Use: Examples from Localized and National Survey Data

Michael J. Stern, Alison E. Adams, and Jeffrey Boase

Although attention has been given to how broadband access is related to economic development in rural areas, scant consideration has been given to how it may be associated with voluntary participation. This issue is important in that numerous studies have shown how much more vital community participation is in rural areas as compared to suburban and urban places. Drawing on three diverse data sets, we examine the influence of broadband access on community participation. In addition, we explore whether broadband access exerts its influence through, in conjunction with, or independent of social networks. The results suggest that broadband access and social network size have independent effects on volunteering in rural places.

Key Words: rural sociology, social networks, broadband, digital inequality, volunteerism

People are increasingly reliant on the Internet and other information and communication technologies (ICT) in their business, academic, and personal spheres. The Internet is a pervasive medium through which individuals can engage in everything from personal communication to civic participation; it can serve as a vehicle for communication on formal (e.g., professional communication) and informal (e.g., emailing friends and

family members) levels, as well as a source for entertainment and social activities (Quan-Haase and Wellman 2004). Moreover, Internet users can seek out information on topics such as finances, education, and politics that would improve one's life chances (La Rose et al. 2007). Because people can use the Internet to engage socially and civically, the technology is recognized as an important tool for many different aspects of social life.

Still, some researchers have warned that increased use of the Internet leads to weakened community ties, a decrease in common interests at the local level, and decreases in levels of voluntary or community participation (e.g., Turkle 1996). However, other studies over the past decade have shown that this view is largely unfounded. In some cases, Internet use is positively related to active contributions to community vitality, such as various forms of civic engagement and community participation (Mossberger, Tolbert, and McNeal 2008, Wellman et al. 2001). Yet, few studies have attempted to examine the effects of broadband or examined any of the mechanisms and intervening factors that could be impacting these relationships.

The purpose of this paper is to explore and explicate a number of issues relevant to how Internet usage, in particular broadband use, is related to community participation among rural residents.

Michael J. Stern is Assistant Professor of Sociology in the Department of Sociology and Anthropology at the College of Charleston in Charleston, South Carolina; Alison E. Adams is a PhD candidate in the Department of Sociology at the University of Florida in Gainesville, Florida; and Jeffrey Boase is Assistant Professor in the Department of Communication at Rutgers, The State University of New Jersey, New Brunswick, New Jersey.

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To do this, we draw on theories of social capital, which provide a lens for our discussion. In particular, we focus on *participatory capital* (volunteering at various levels), *network capital* (social networks), and *digital capital* (use of the Internet and access to broadband technologies). We use three data sets to explore the theoretical perspectives empirically and address the potential intersections of these three types of capital.

Overview of Theoretical Background and Issues

Communities are greater than the sum of their parts. Rather than simply an aggregate of individuals, communities are characterized by the relationships, networks, activities, and functions that the individuals create and build together. The “networks, norms, and trust that facilitate coordination and cooperation for mutual benefit” within a community is referred to as social capital (Putnam 1993, p. 35). Social capital is a result of collective effort rather than individual contributions to a community (La Due Lake and Huckfeldt 1998). A critical component of social capital is the relationships that develop between individuals in a community. As a result, social capital is an important aspect in understanding rural communities, as they are unique in their types of social networks, relationships, and resources (e.g., Wilkinson 1991). The development of social capital can have an impact on community characteristics such as economic health, political participation (La Due Lake and Huckfeldt 1998), and capacity for community change and growth. In addition, different types of ties and relationships can affect crucial facets of social capital, such as levels of community participation (Ryan et al. 2005, Stern and Adams 2010). Because of the vastness of the concept, researchers have characterized many different “types” of social capital. Here, we discuss participatory, network, and digital social capitals and how they work together to contribute to the vitality of rural communities.

Participatory Capital

Various forms of community participation are established measures or proxies of social capital (e.g., Hampton and Wellman 2003) because they reflect “the degree to which people become involved in their community, both actively and pas-

sively” (Quan-Haase and Wellman 2004, p. 113). The term “participatory capital” refers to community participation that “affords opportunities for people to bond, create joint accomplishments, and aggregate and articulate their demands and desires” (Wellman et al. 2001, p. 437). An important example of participatory capital is volunteering. Voluntary organizations have the capacity to provide services such as elder care, shelter to the homeless, and after school programs, which can build a community’s social capital (Putnam 1993). Volunteering in rural communities is inherently linked to levels of community attachment, or how residents feel about their community (Ryan et al. 2005). Two types of civic participation contribute to a community’s participatory capital: nominal and active. Nominal participation includes membership in a voluntary organization or attending a local event. For example, a person who attended their child’s PTA meetings, but was not active in the leadership, would be considered a nominal participant. Active participation, on the other hand, refers to “taking a role in or making an investment in the success of the group or even through leadership responsibilities and/or participating in actions aimed at community change” (Stern and Dillman 2006, p. 411). Both types of community participation contribute to social capital in rural communities, although in different ways and to different extents.

Network Capital

The relationship between social ties and community participation is complementary in nature. The more connected people are to their community, the more likely it is that they will participate in voluntary activities that work toward local benefit (Ryan et al. 2005). People are also more likely to feel attached to their communities if they interact with local ties (Wilkinson 1991, Bell 1998). For example, “people who report frequent conversations and meetings with friends and acquaintances” are more likely to become involved in voluntary or community activities than those who have limited social interactions (Wilson and Musick 1997, p. 699). This sense of shared identity can increase the rate of volunteering at the local level (Wilson 2000). In his study of rural places, Wilkinson (1991, p. 2) describes this social phenomenon as the “community field,” or “a process of

interrelated actions through which residents express their common interest in the local society.” Community participation lends itself to the development of local social ties. The networks of social ties that arise from and contribute to community participation are also an essential component of rural social capital, termed “network capital” (Wellman et al. 2001, p. 437). Social networks can function to “facilitate coordination of civic engagement activities, ease communication, and provide needed information about the trustworthiness of other individuals” (Putnam 1993, p. 4).

Digital Capital.

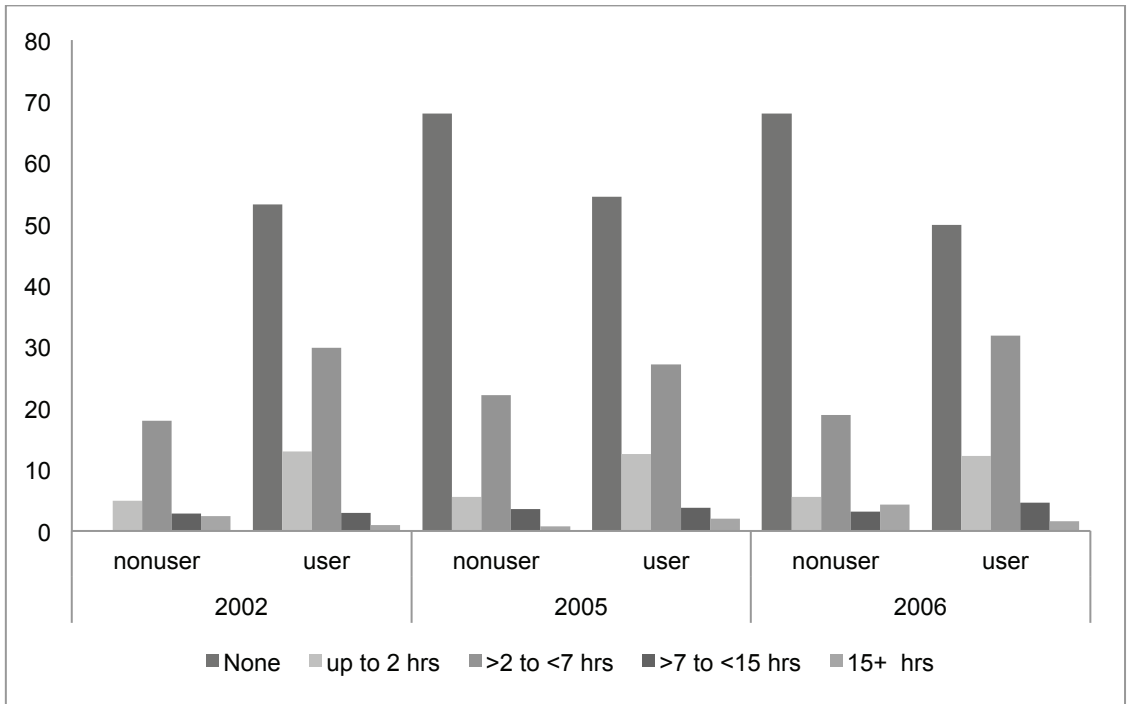
The focus on how social capital is built and reinforced recently expanded to include the influences of the Internet and other ICT. This research typically focuses on how Internet use can increase or, at the very least, supplement social capital. For example, some have shown that information and communication technologies can make it easier for people to participate in community voluntary organizations through providing a conduit for information about local happenings (Wellman et al. 2001). Other research in rural areas has shown that Internet users are more likely to be involved in community events, organizations, and to take leadership in local undertakings than are non-Internet users (Stern and Dillman 2006). Furthermore, these same rural residents use email as a way to communicate and obtain information regarding voluntary organizations and events (Stern and Adams 2010). In this way, digital capital can work to foster both nominal and active local participation in rural communities. However, a number of recent studies have shown that the diffusion of broadband technologies is a key determinant to how people use the Web (Stern, Adams, and Elsassner 2009, Mossberger, Tolbert, and McNeal 2008) and, therefore, is critical to understanding digital capital.

Capital Interrelations

The development and growth of social capital is dependent on many interrelated aspects. The inclusion of digital capital illustrates a reflexive understanding of social capital that encompasses new ways in which people interact and engage at the local level. For example, the Internet can provide important opportunities for social networking, which is associated with higher levels of

community participation. The relationship between participatory capital, network capital, and digital capital indicates that rural areas may experience disparity in social capital-building resources because of slow technological diffusion, as well as a tempered acceptance of new Internet technologies when they are available (Mossberger, Tolbert, and McNeal 2008). If individuals have unequal access to these types of social networks, there may be implications for community participation in areas or among groups that are unable or unwilling to access high-speed Internet technology. This disparity may also have particular implications for rural areas, as their vitality, development, and growth are oftentimes dependent on citizen participation in community-building efforts (Allen and Dillman 1994, Aigner et al. 1999). We are not arguing that social networks that either stem out of or are fostered through Internet-based interactions are the most important basis for determining community participation. However, social networks as social resources (Wilson 2000), informal social interaction (Wilson and Musick 1997), and different levels of social ties (Ryan et al. 2005) are all found to positively influence participatory capital. The established relationship between digital capital and the development of network capital illustrates the important relationship between Internet use and community participation via this association. As advanced technology can enable Internet users to more effectively navigate the Internet, as well as take advantage of opportunities not available to dial-up users, we argue that high-speed Internet technology can provide communities with unique opportunities to build participatory, network, and digital types of social capital.

This is an important issue given that there are noted differences in Internet use between broadband and dial-up users (Stern, Adams, and Elsassner 2009). The shift toward high-speed Internet connections, which facilitate many different functions on the Internet (Whitacre 2007), indicates that this is a disparity that may have long-ranging effects (La Rose et al. 2007). For example, many websites that offer financial, political, and health information require connections that operate at higher speeds than dial-up modems can provide. It is possible there is an important division between those who have dial-up connections and those who have access to broadband modems. Evidence suggests that Internet users who have



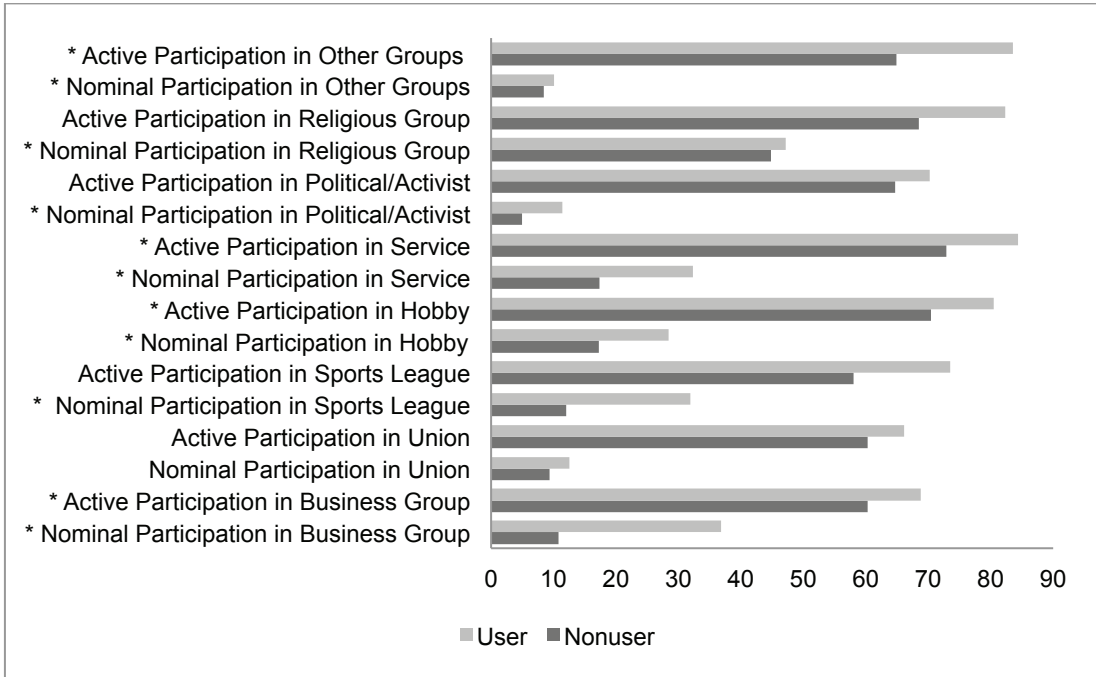
*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$; † ≤ 0.10 Data Source: World Internet Survey.
 Note: Internet use is significantly related to hours volunteering in each year.
 (Spearman’s Rho values for each year were as follows: 2002, 0.12***; 2005, 0.11***; 2006, 0.15***).

Figure 1. Internet Use and Volunteering 2002 to 2006

access to broadband technology are not only more likely to overcome issues with proficiency, they are more likely to use their connections for more advanced applications (Mossberger, Tolbert, and McNeal 2008). Stern, Adams, and Elsasser (2009) have shown that the diffusion (or lack thereof) of Internet technology affects the different types of ways individuals can or will use their Internet connections.

Because of the disparity in access to broadband Internet technology, it follows that some populations will have fewer chances to take advantage of the types of social, political, and economic opportunities at the local level that comprise the common working definition of social capital. Thus, some have argued that these populations are excluded from the community action infrastructure. For example, almost a decade ago in their study of a “wired” suburban neighborhood, Hampton and Wellman (2003, p. 286) found that dial-up access limited computer-mediated communication to those periods when someone was

not on the phone or expecting a call, and as a result dial-up modems limited people’s availability to their community social network. Similarly, Boase et al. (2006) found that people who use the Internet at greater levels, generally broadband users, tended to have larger social networks, or greater network capital. Some comparable findings exist for volunteering and civic engagement, or participatory capital. For example, Stern and Dillman (2006) found that Internet users were more likely than nonusers to be involved in local groups, organizations, and events and that as Internet use increased so too did local participation. Mossberger, Tolbert, and McNeal (2008) argue that while the Internet may have the potential to mitigate some 30 years of decline in civic engagement, there still exists a difference between people who use broadband technology and those who do not. For instance, being able to email large groups of individuals about local happenings and events, as well as searching out civic and political information quickly and easily, could



Note: Significance tests are based on logistic regressions of Internet use on domain and level specific participation.

* $p \leq 0.05$

Models control for age, income, race, and education.

Internet use is coded 1=user; 0=nonuser. Data Source: Strength of Internet Ties.

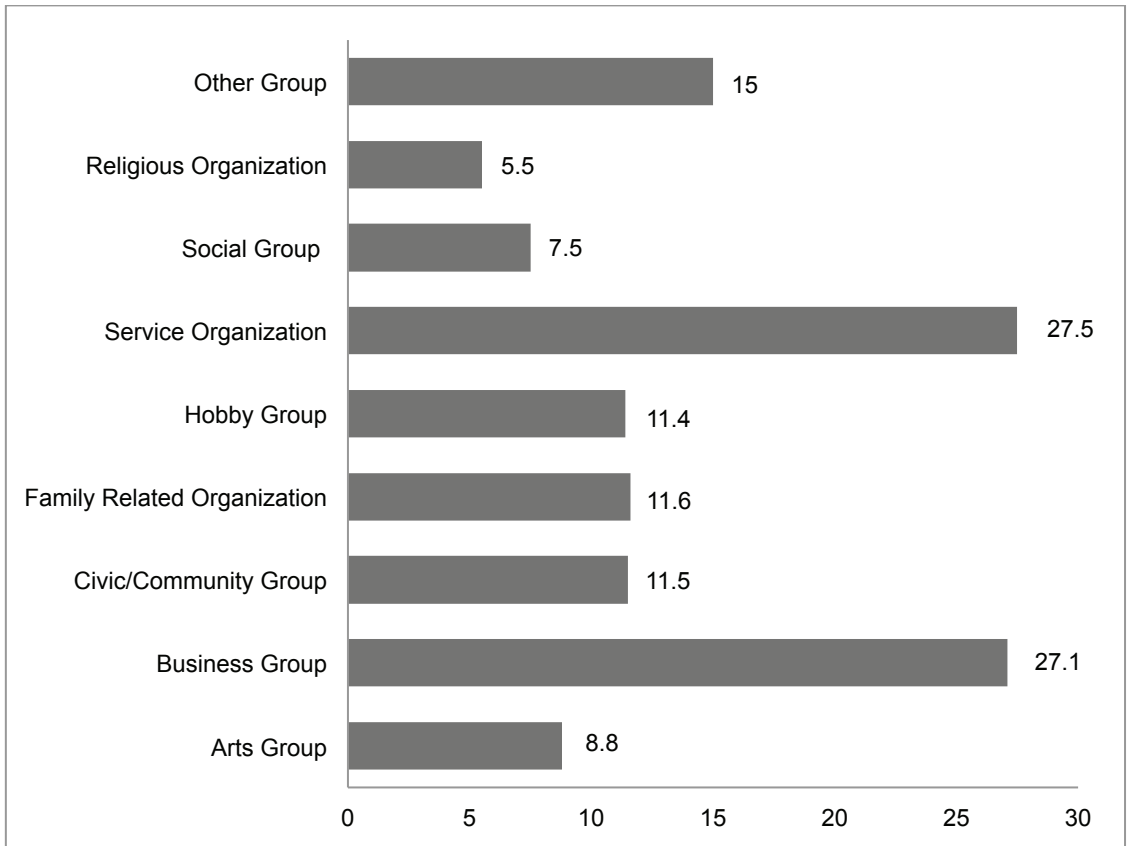
Figure 2. Internet Use and Domain Specific Volunteering: Nominal and Active Levels

potentially help to mobilize people, especially among younger generations. Yet, doing so with slow, telephone line monopolizing dial-up modems inhibits the Internet’s ability to contribute to this type of social capital formation.

Given that rural communities are behind other types of places in terms of the availability and use of broadband high-speed technology, they may experience these disadvantages in two ways. On the individual level, people in rural areas may not be as able to take advantage of tools and opportunities available on the Internet that would improve their daily lives through accessing their finances or seeking out medical information. At the community level, the Internet provides an important medium for communication and information exchange regarding community groups and activities. Without this tool, community members may be less likely to be recruited, find information about these activities, or communicate with others regarding these types of participation. Again, this may also have particular implications

for rural areas, as their vitality, development, and growth are oftentimes dependent on citizen participation in community-building efforts (Aigner et al. 1999).

In the following analysis, we assess how these types of social capital interact. Specifically, we begin by examining the relationship between Internet use and civic involvement both in general and by specific domain (e.g., business, religious, etc.). Then, we turn to the interactions of broadband use, social networks, and civic involvement for rural residents. Finally, we use a path model to examine intervening relationships. It should be noted that there are other influential factors that are associated with rates of community participation and participation in formal groups and organizations. For example, an individual’s age, socioeconomic status, race, and levels of religiosity are all positively related to volunteering (Wilson and Musick 1997). We take these factors into account as well.



Data Source: Making Community Work Survey.

Figure 3. Do You Use the Internet to Learn about or Receive Information from Local Groups?

Data Sources and Analytic Strategy

In the following analyses, we use three different data sets. The first and most often used data come from The *Strength of Internet Ties* study. This Pew Internet & American Life Project study surveyed Americans' use of the Internet. For the study, Princeton Survey Research Associates International surveyed 2,200 adults aged 18 years and older, with a final response rate of 35 percent. The data are based on a national-level Random Digit Dial (RDD) telephone survey; the sample of telephone numbers was selected from telephone exchanges in the continental United States.

The second data set we use is the *World Internet Survey*, which was collected at the University of Southern California's Center for the Digital Future. We use data from the 2002, 2005, and 2006 waves of the survey. The data are based on a

national-level RDD telephone survey using an Equal Probability Selection Method. The original sample was drawn in 2000, and replacement samples were selected in subsequent years.

The final data set we use comes from the *Making Community Work Study*. The data come from a study of two adjacent small cities in an isolated region of the Western United States. Researchers sampled 2,000 households with telephone listings. Despite the population concentration of the two cities, the surrounding countryside is sparsely populated. The rural nature of the region suggests fewer unlisted numbers than exist in larger cities (Lavrakas 1987, p. 33). An 11-page questionnaire was used and achieved a response rate of over 69 percent (1,315 completed surveys). With the survey, the applied principles from the tailored design method were used in the survey implementation processes, which included

Table 1. Summary of Negative Binomial Regression Models for Degree of Rurality on Number of Groups Volunteered for (Total, Active, and Nominal Levels of Participation) Controlling for Other Factors

| | Degree of Rurality → Total, Active, and Nominal Levels of Participation | | |
|-----------------------|---|-------|----------------|
| | Rurality | | |
| | Beta | %Δ | Log-Likelihood |
| Total Participation | 0.03* | +3.1% | -3119.1 |
| Nominal Participation | 0.02* | +2.3% | -2309.8 |
| Active Participation | 0.04** | +4.0% | -2220.1 |

*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$; † $p \leq 0.10$

Notes: Models control for age, income, race, and education. Rurality refers to the Beale Code Continuum where 1 equals totally urban and 9 indicates totally rural; see Appendix. Data Source: Strength of Internet Ties.

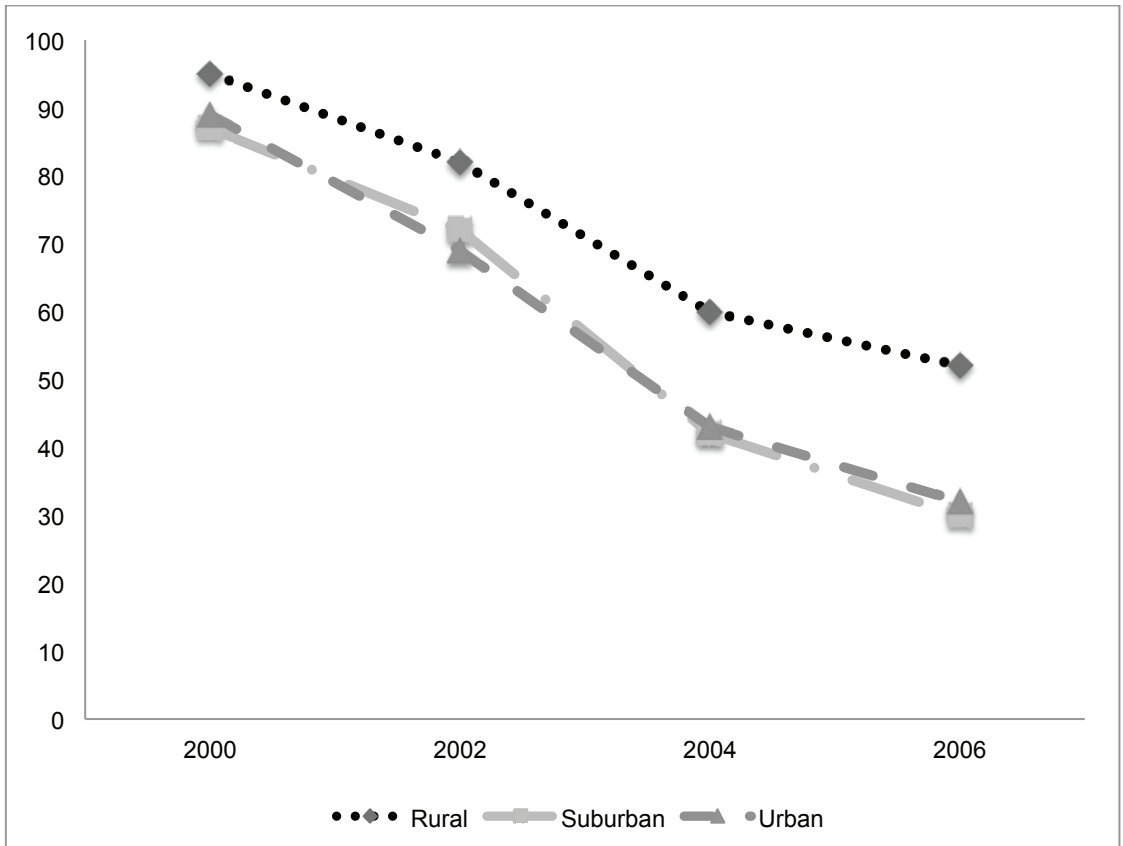
three mail contacts (Dillman 2000). The first contact contained a personally signed cover letter explaining the survey's goals and content, a self-addressed stamped return envelope, a \$2 token incentive, and the questionnaire. Additionally, the cover letter requested that a household member 18 years or older with the most recent birthday complete the questionnaire to insure that we received a balance of men and women. Two weeks later, a follow-up postcard was sent to all respondents, thanking those who had responded and encouraging those who had not responded to please do so. Finally, about two weeks after the postcard, a replacement questionnaire and return envelope were sent to individuals who had not yet responded, along with a personally signed letter encouraging them to fill out the questionnaire.

Measures and Analytic Approach

There are two different types of dependent variables in the analysis—social network size (total number of social ties) and volunteering (number of groups for which one volunteered over the past year in total, both actively and nominally, and the total hours volunteered per week over the past year). Regarding the social network data, we used *The Strength of Internet Ties* data, which asked respondents to list their total number of ties; the resultant variable was the sum of the number of reported number core and significant ties. We report data from all three surveys for volunteering. The *Strength of Internet Ties* survey

asked respondents to report their level of involvement in nine different voluntary associations; additionally, they were given the opportunity to report on another voluntary association that may not have been listed.

Membership in these associations was coded as: “not a member,” “a nominal member,” or “an active member.” Active membership involved regularly attending meetings, contributing time or money, or holding a leadership position. Passive membership involved simply being a member of an association, but not being an active member. With the *World Internet Survey*, we used the hours participated per week over the past year (for Internet users and nonusers). Regarding the *Making Community Work* study, a list of local groups, clubs, and organizations were organized by type into nine different categories (religious, fraternal, service, arts and cultural, union and professional, civic, family-orientated, hobby and sport, and “other groups”). Respondents were asked through what media they learned about (or were contacted by) these local groups, clubs and organizations (i.e., Internet, newspaper, radio, or word of mouth). The resulting variable used in this analysis is the cumulative number of groups, clubs, and organizations for which the Internet played a role in their participation. The variable, then, did not exclude people who did not use the Web as a means of learning about or communicating with a certain type of group; instead, it provided them with a score of 0.



Data Source: See Stern, Adams, and Elsasser (2009).

Figure 4. Percent of People Using a Dial-Up Modem by County Type

What is the Empirical Relationship between Internet Access and Community Participation?

As suggested above, the Internet could function to facilitate ease of participation in community activities, groups, and organizations. It provides a medium through which community members can obtain information on local events and meetings (Sproull, Conley, and Moon 2005). In the process of seeking information for community events, individuals who use the Internet for information exchange are more likely to “encounter mobilizing information and experience more opportunities for recruitment into civic participation” (Shah, Kwak, and Holbert 2001, p. 154).

Although Putnam’s book, *Bowling Alone* (Putnam 2000), provided some evidence that individuals who rely on the Internet for news are less likely to become involved in volunteer activities

or be involved in social networks, others have shown the opposite to be true (Stern and Dillman 2006, Boase et al. 2006). Thus, the Internet has the *potential* to lead to high levels of community participation (Hampton and Wellman 2003). In Figure 1, we show national level data from the United States on the relationship between hours volunteered over the past year and Internet use. The figure shows that the number of hours people volunteered in a given week was much higher for Internet users than nonusers, and this relationship remained relatively stable from 2002 through 2006. In all three years analyzed, Internet users participated at greater levels than nonusers at statistically significant levels.

In addition, Figure 2 shows the percent of Internet users versus nonusers who volunteered by type of group and activity level. The data show that regardless of the type of group and level of

involvement, Internet users were more likely to volunteer. For six of these types of groups, the comparisons reached statistical significance at conventionally accepted levels while controlling for age, income, race, and education.

Does Using the Internet Play a Role in the Participation Process in Rural Areas?

Rural areas tend to have higher levels of local involvement than do urban and suburban areas (Allen and Dillman 1994). As evidence, we provide Table 1, where we see the percent change in the number of groups that people participated in at the nominal (card-carrying members) and active (leaders or organizers) levels, as well as their total participation based on degree of rurality, while taking into account the influence of age, income, race, and education. What's clear is that rural individuals participate at a higher level than their suburban and urban counterparts, regardless of demographic differences.

Sproull and Kiesler (2005) have shown that between 10 million and 15 million people throughout the world use the Internet to participate in volunteer activities. They suggest that people use the Internet to find information about salient issues and activities in their communities. This awareness can serve as an impetus for action and involvement (Norris 2001). Figure 3 reports the results from a recent rural community survey that asked rural respondents who volunteered at the local level if they either learned about volunteering through the Internet or received emails from the group or organization. Interestingly, the data show that certain types of groups and organizations may better lend themselves to the use of these technologies (e.g., business and service). Nonetheless, we find that people are using the Web to get information about local groups and organizations.

What is the Empirical Relationship between Broadband Internet Use and Community Participation?

Even if the Internet provides opportunities for some people to get involved at the local level, the issue remains that these opportunities are not available for everyone. In the recent past, there has been concern about the "digital divide," or the disparity between those with access to the Internet

and those without. Internet technology diffused faster to urban and suburban areas than to rural places (Whitacre and Mills 2007, Horrigan 2006, Townsend 2001). As a result, researchers and policy makers were concerned about the effects of the lack of Internet access within rural communities (Donnermeyer and Hollifield 2003). However, in less than a decade, there has been a dramatic increase in Internet penetration to rural areas, and research now shows that there is little disparity in Internet access between rural and other types of places (Mossberger, Tolbert, and McNeal 2008). Rural communities now are experiencing different types of digital disadvantages in terms of dial-up (slower) access to the Internet versus broadband (Stern, Adams, and Elsasser 2009, Mossberger, Tolbert, and McNeal 2008). Indeed, rural communities in North America are notably lagging in access to high-speed Internet technology. Even when the infrastructure is available for advanced ICT in rural areas, rural residents are less likely to adopt high-speed Internet technology (Whitacre and Mills 2007) than are residents in suburban or urban areas (Donnermeyer and Hollifield 2003). In Figure 4, we show the changes in access to broadband technologies by county type between 2000 and 2006. It is clear that rural counties lag behind, as evidenced by the large number of people still using dial-up connections relative to suburban and urban Internet users.

We are not arguing here that relationships that either stem out of or are fostered through Internet-based interactions are the most important basis for determining community participation. As technology can enable Internet users to more effectively navigate the Net, as well as take advantage of opportunities not available to dial-up users, high-speed Internet technology can provide communities with unique opportunities to garner the support of community members as well as mobilize members in events, groups, and organizations that work to better the community. One consideration is that the Internet has shown the potential to make it easier for those who are already involved in community groups to become more active (Norris 2001). In other words, those who are already participating in organizational involvement are likely to participate in their local organizations through Internet-based interaction (Wellman et al. 2001). This association translates to social networks in that "a higher level of belonging to real communities translates into a higher pro-

density for interaction online” (Matei and Ball-Rokeach 2001, p. 560); thus, the Internet can be a helpful resource for those already involved. A second issue for consideration is that the Internet can help overcome several limitations to community participation that have been documented in the past. For example, working mothers, housebound individuals, and people who lack transportation can utilize the Internet to become involved in their community on their own time, rather than having to attend meetings (Sproull and Kiesler 2005). This type of participation can also have benefits for the volunteers themselves, as it can open doors to social networks that may have been previously untapped or underdeveloped (Norris 2002).

Research suggests that Internet use is also positively related to social network size. For example, Hampton and Wellman (2003, p. 305) suggest that Internet users have “larger neighborhood networks, more recognition of neighbors, greater frequency of communication (on- and off-line) and participation in the public and private realms.” The introduction of the Internet into the social network can lead to the creation of “community networks” and thus build network capital. Indeed, offline social networks can be supplemented by the communication, interaction, and information exchange that occur online (Wellman et al. 2001). As discussed above, social networks and community participation are integrally related in rural areas (e.g., Ryan et al. 2005, Wilkinson 1991) and these places have unique challenges relative to ICTs (e.g., Whitacre 2008). We must, then, examine the intersections of social networks and broadband use on voluntary participation in rural communities. Therefore, we reduce the sample for the final analysis to only rural residents.

Table 2 shows the results for total, active, and nominal participation by broadband use, social network size, demographics, and the interaction between broadband use and social network size. We include the interaction term here because the literature above suggests the possibility that broadband use and social networks are mutually reinforcing in terms of community participation. Here we report the summary of exponentiated coefficients from the negative binomial regression models, which we have converted to percentages from the odds ratios ($\exp\{b\} - 1 * 100$). Thus, the table shows the percent change in the number of groups one has participated in, as influenced by

the independent variables.

The first panel reports the results for total participation. Both broadband use and social network size have independent and positive influences on participation after the inclusion of demographics and the interaction term, although the effects for social network size are much greater (48.1 percent, $p < 0.10$; 60.0 percent, $p < 0.001$, respectively). Nonetheless, the model suggests that there are apparent effects on total participation for both of these variables. In terms of active participation, we find the same results; however, the independent effects for broadband are greater than they were for total participation. This means that broadband use has a stronger relationship to active participation net of the influence of other variables and its interaction with social network size. Social network size also has a stronger relationship with active as compared to total participation. Finally, the model for nominal participation looks similar to our previous two models, with social network size having a more significant influence on participation than broadband use. However, the effects for broadband and social network size are smaller overall than were found with active participation. Thus, while others and we have suggested that there are interrelations between network and digital capital that help to facilitate local community participation, these results suggest that this is not the case. Therefore, we must explore these capital interrelations in great detail.

Are There Intervening Relationships?

Given the relationships from the previous analysis, we examine the possibility that social networks serve as a mediator between broadband use and active participation while controlling for age, income, race, and education; however, we only present education in the model due to its robust effects. We use a path model because, as research suggests, one’s social network size may play a role in the relationship *between* digital and participatory capital, and our multivariate model cannot reveal this type of information (Figure 5).

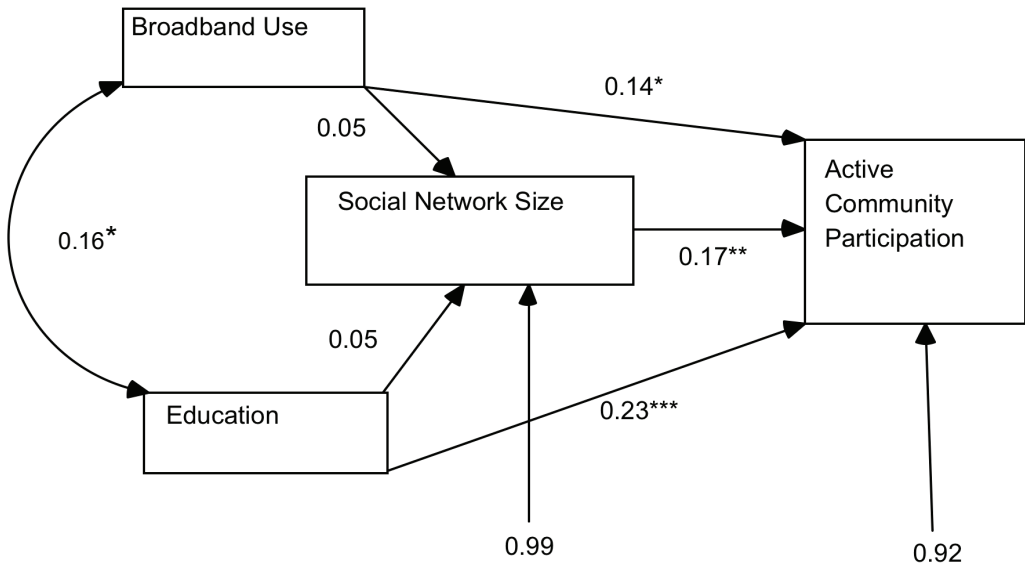
A path model allows us to assess two or more causal models—in this case, the effects of social networks and broadband use—as well as the interrelations between predictors. Therefore, based on the results above, we can use this model to more precisely address whether social networks exert their influence through broadband use or not.

Table 2. Summary of Negative Binomial Regression Models for the Effect of Broadband and Social Network Size on Number of Groups Volunteered for (Total, Active, and Nominal Levels of Participation) Controlling for Other Factors

| | Total Participation | | | Active Participation | | | Nominal Participation | | | | | |
|---|---------------------|----------|---------|----------------------|---------|---------|-----------------------|---------|---------|---------|---------|---------|
| | %Δ | %Δ | %Δ | %Δ | %Δ | %Δ | %Δ | %Δ | %Δ | | | |
| Broadband | 27.6* | -- | 16.8 | 48.1† | 40.5** | -- | 27.9* | 61.7* | 17.8† | -- | 9.8 | 35.0† |
| Number of Social Ties (*100) ^a | -- | 60.0*** | 50.0** | 60.0** | -- | 70.0*** | 50.0** | 70.0** | -- | 50.0*** | 40.0* | 50.0*** |
| Age | -- | -- | -9.3 | -8.1 | -- | -- | -2.6 | -1.9 | -- | -- | -5.7 | -5.3 |
| Age ² | -- | -- | 2.1 | 1.8 | -- | -- | 1.1 | 0.9 | -- | -- | 1.4 | 1.3 |
| Education | -- | -- | 21.1*** | 21.3*** | -- | -- | 22.6*** | 22.8*** | -- | -- | 19.8*** | 19.9*** |
| Race | -- | -- | -4.2 | -3.6 | -- | -- | -4.2 | -3.6 | -- | -- | -3.4 | -2.8 |
| Income | -- | -- | 4.1 | 4.0 | -- | -- | 4.3 | 4.2 | -- | -- | 3.0 | 3.0 |
| Broadband * Number of Social Ties | -- | -- | -- | -0.5 | -- | -- | -- | -0.5 | -- | -- | -- | -0.4 |
| N | 236 | 447 | 234 | 234 | 239 | 459 | 237 | 237 | 236 | 447 | 234 | 234 |
| Log-Likelihood | -558.64 | -1002.38 | -537.13 | -534.25 | -397.41 | -709.65 | -377.97 | -377.25 | -416.71 | -759.39 | -359.72 | -394.92 |

*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$; † $p \leq 0.10$

^a We have multiplied the coefficients and percent change by 100 to aid interpretation.



*** $p \leq 0.001$; ** $p \leq 0.01$; * $p \leq 0.05$; † $p \leq 0.10$

Figure 5. Path Model for Intervening Relationships

The path model supports what we saw earlier, with broadband use and social network size having positive and significant yet independent relationships with active participation ($\beta=0.14$, $p < 0.05$; $\beta=0.17$, $p < 0.01$, respectively).

Summary and Discussion

We have come a long way in a very short time. Less than a decade ago, we attempted to forecast whether the Internet would “destroy” local communities by pulling people’s interests away from these places. Today, we worry about how those with slower, more antiquated connections are being systematically left out of their local communities. In this paper, we have shown that these new fears may be better founded than their predecessors.

In particular, as many before us, we have shown that the use of ICTs is associated with higher degrees of participation at various levels and across a variety of types of groups and organizations. In addition, we have shown that some people actually use their connections to get involved, through searching for information about groups, receiving

information via email from organizations, or both. Importantly, the data above suggest that using broadband technologies is associated with higher levels of civic participation at the nominal and active levels, beyond just their ability to grow one’s social network. Thus, Internet use and its diffusion matter to community participation; that is, digital and participatory capitals are related, and not solely as a result of social networks. These results were present even when we considered the influence of income, age, education, and race.

Social networks also do matter a great deal to community participation. We can say, then, that the digital and network capital are powerful influences on civic participation. This point is important because a number of recent studies have shown that Internet users have larger social networks than nonusers (Boase et al. 2006), while at the same time, others are arguing that our social networks are shrinking (McPherson, Smith-Lovin, and Brashears 2006) and levels of civic participation are at an all time low (e.g., Putnam 2000). Perhaps ICTs can play an important role in bringing up levels of civic involvement. We must note, however, that due to the limitations of cross-

sectional data, we cannot say whether people have larger social networks because they participate, or whether having a large social network influences one's decision to get involved, as theory would suggest (e.g., Ryan et al. 2005, Wilkinson 1991).

The data we have presented here suggest that rural communities, which perhaps most rely on volunteering to get things done, might be at a disadvantage. This disadvantage stems from a lack of access to or willingness to adopt broadband technologies. These findings support work on what has been defined as "digital inequality"—an inequality borne out of a lack of digital capital. As more people are gaining access to the Internet, research that traditionally addressed the haves and have-nots is now moving toward the technological diffusion and proficiency divides (e.g., inequities in access to landline-based technologies, cable/broadband connections, and wireless, as well as the skills to use the Internet effectively). Recent studies suggest that connection types may serve as a bridge that can encourage continued Internet use (Horrigan and Murray 2006). A lack of access to the Internet and broadband technologies feeds proficiency divides (Mossberger, Tolbert, and Stansbury 2003, Stern, Adams, and Elsasser 2009). These divides can be measured by whether one uses the technology for creating better efficiencies in daily activities; gathering information for various aspects of life, including pursuing occupational training; making major financial decisions; and searching for new places of residence (Horrigan and Rainie 2006); or, as we have shown here, contributing to their local communities.

References

- Allen, J.C., and D.A. Dillman. 1994. *Against All Odds: Rural Community in the Information Age*. Boulder, CO: Westview Press.
- Aigner, S.M., C.B. Flora, S.N. Tirmizi, and C. Wilcox. 1999. "Dynamics to Sustain Community Development in Persistently Poor Rural Areas." *Community Development Journal* 34(1): 13-27.
- Bell, M. 1998. "The Dialogue of Solidarities, or Why the Lion Spared Androcles." *Sociological Focus* 31(2): 181-199.
- Boase, J., J. Horrigan, B. Wellman, and L. Rainie. 2006. *The Strength of Internet Ties: The Internet and Email Aid Users in Maintaining their Social Networks and Provide Pathways to Help when People Face Big Decisions*. Pew Internet & American Life Project. Available at http://www.pewInternet.org/pdfs/pip_Internet_ties.pdf (accessed October 2007).
- Dillman, D. 2000. *Mail and Internet Surveys: The Tailored Design Method, 2nd Edition*. New York: John Wiley & Sons, Inc.
- Donnermeyer, J., and C. Hollifield. 2003. "Digital Divide Evidence in Four Rural Towns." *IT & Society* 1(4): 107-117.
- Hampton, K., and B. Wellman. 2003. "Neighboring in Netville: How the Internet Supports Community and Social Capital in a Wired Suburb." *City & Community* 2(4): 277-311.
- Horrigan, J. 2006. "Home Broadband Adoption 2006: Home Broadband Adoption Is Going Mainstream and That Means User-Generated Content Is Coming from All Kinds of Internet Users." Pew Internet & American Life Project. Available at http://www.pewInternet.org/pdfs/PIP_Broadband_trends2006.pdf (accessed June 2010).
- Horrigan, J., and K. Murray. 2006. "Rural Broadband Internet Use." Data Memo. Pew Internet & American Life Project. Available at <http://www.pewInternet.org/> (accessed October 2007).
- Horrigan, J., and L. Rainie. 2006. "The Internet's Growing Role in Life's Major Moments." Pew Internet & American Life Project. Available at http://www.pewInternet.org/pdfs/PIP_Major%20Moments_2006.pdf (accessed October 2007).
- La Due Lake, R., and R. Huckfeldt. 1998. "Social Capital, Social Networks, and Political Participation." *Political Psychology* 19(3): 567-584.
- LaRose, R., J. Gregg, S. Strover, J. Straubhaar, and S. Carpenter. 2007. "Closing the Rural Broadband Gap: Promoting Adoption of the Internet in Rural America." *Telecommunications Policy* 31(6-7): 359-373.
- Lavrakas, P. 1987. *Telephone Survey Methods: Sampling, Selection and Supervision*. London: SAGE Publications.
- Matei, S., and S. Ball-Rokeach. 2001. "Real and Virtual Social Ties: Connections in the Everyday Lives of Seven Ethnic Neighborhoods." *American Behavioral Scientist* 45(3): 550-564.
- McPherson, J.M., L. Smith-Lovin, and M. Brashears. 2006. "Social Isolation in America: Changes in Core Discussion Networks over Two Decades." *American Sociological Review* 71(3): 353-375.
- Mossberger, K., C. Tolbert, and M. Stansbury. 2003. *Virtual Inequality: Beyond the Digital Divide*. Washington, D.C.: Georgetown University Press.
- Mossberger, K., C. Tolbert, and R. McNeal. 2008. *Digital Citizenship: The Internet, Society, and Participation*. Cambridge, MA: The MIT Press.
- Norris, P. 2001. *Digital Divide: Civic Engagement, Information Poverty, and the Internet Worldwide*. Cambridge: Cambridge University Press.
- . 2002. "The Bridging and Bonding Role of Online Communities." *The Harvard International Journal of Press/Politics* 7(3): 3-13.
- Putnam, R. 1993. "The Prosperous Community: Social Capital and Public Life." *The American Prospect* 13(6): 35-42.
- . 2000. *Bowling Alone: The Collapse and Revival of American Community*. New York, NY: Simon & Schuster.
- Quan-Haase, A., and B. Wellman. 2004. "How Does the Internet Affect Social Capital?" In M. Huysman and V. Wulf, eds., *Social Capital and Information Technology*. Cambridge, MA: The MIT Press.
- Ryan, V., D. Kerry, A. Agnitsch, L. Zhao, and R. Mullick. 2005. "Making Sense of Voluntary Participation: A Theoretical Synthesis." *Rural Sociology* 70(3): 287-313.

- Shah, D., N. Kwak, and R. Holbert. 2001. "Connecting' and 'Disconnecting' with Civic Life: Patterns of Internet Use and the Production of Social Capital." *Political Communication* 18(2): 141-162.
- Sproull, L., C. Conley, and J. Moon. 2005. "Prosocial Behavior on the Net." In Y. Amichai-Hamburger, ed., *The Social Net: Understanding Human Behavior in Cyberspace*. New York: Oxford University Press.
- Sproull, L., and S. Kiesler. 2005. "Public Volunteer Work on the Internet." In W. Dutton, B. Kahin, R. O'Callaghan, and A. Wyckoff, eds., *Transforming Enterprise*. Cambridge, MA: The MIT Press.
- Stern, M., and A. Adams. 2010. "Do Rural Residents Really Use the Internet to Build Social Capital? An Empirical Investigation." *American Behavioral Scientist* 53(9): 1389-1422.
- Stern, M., A. Adams, and S. Elsasser. 2009. "How Levels of Internet Proficiency Affect Usefulness of Access across Rural, Suburban, and Urban Communities." *Sociological Inquiry* 79(4): 391-417.
- Stern, M., and D. Dillman. 2006. "Community Participation, Social Ties, and Use of the Internet." *City and Community* 5(4): 409-424.
- Townsend, A. 2001. "The Internet and the Rise of the New Network Cities, 1969-1999." *Environment and Planning B: Planning and Design* 28(1): 39-58.
- Turkle, S. 1995. *Life on the Screen: Identity in the Age of the Internet*. New York: Simon and Schuster.
- Wellman, B., A. Quan-Haase, J. Witte, and K. Hampton. 2001. "Does the Internet Increase, Decrease, or Supplement Social Capital?" *American Behavioral Scientist* 45(3): 436-455.
- Whitacre, B., and B. Mills. 2007. "Infrastructure and the Rural Urban Divide in High-Speed Residential Internet Access." *International Regional Science Review* 30(3): 249-273.
- Whitacre, B. 2007. "Factors Influencing the Temporal Diffusion of Broadband Adoption: Evidence from Oklahoma." *The Annals of Regional Science* 42(3): 661-679.
- Wilkinson, K. 1991. *The Community in Rural America*. New York: Greenwood Press.
- Wilson, J. 2000. "Volunteering." *Annual Review of Sociology* 26: 215-240.
- Wilson, J., and M. Musick. 1997. "Who Cares? Toward an Integrated Theory of Volunteer Work." *American Sociological Review* 62(5): 694-713.

Appendix: 2003 Rural-Urban Beale Codes

2003 Rural-Urban Continuum Codes (Beale Codes)

| Description | Code |
|--|------|
| Counties in metro areas of 1 million population or more | 1 |
| Counties in metro areas of 250,000 to 1 million population | 2 |
| Counties in metro areas of fewer than 250,000 population | 3 |
| Urban population of 20,000 or more, adjacent to a metro area | 4 |
| Urban population of 20,000 or more, not adjacent to a metro area | 5 |
| Urban population of 2,500 to 19,999, adjacent to a metro area | 6 |
| Urban population of 2,500 to 19,999, not adjacent to a metro area | 7 |
| Completely rural or less than 2,500 urban population, adjacent to a metro area | 8 |
| Completely rural or less than 2,500 urban population, not adjacent to a metro area | 9 |