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Internet Connectivity, Community Participation, and Place Attachment: A Longitudinal Study

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Abstract

The effect of Internet connectivity on social involvement, civic participation, and community sentiments has recently received research attention. Mostly, previous studies have been limited in that they did not account for the mechanism that might link Internet connectivity and community participation. This study uses a longitudinal design to examine the effects of Internet connectivity and participation in a local electronic bulletin board on local community involvement and participation. It is hypothesized that Internet connectivity affects community involvement and positive sentiments attached to the locale. Data from a longitudinal survey of two suburban communities in Israel are used to test the hypothesis. The results show that Internet connectivity and attitudes toward technology provide more channels for local civic participation. But, it is the active participation in locally based electronic forums over and above other forms of social capital (such as face-to-face neighborhood meetings, talking with friends, and membership in local organizations) that is associated with multiple measures of community participation. The formation and active participation in local community electronic networks not only adds but also amplifies civic participation and elevated sense of community attachment.

Keywords

internet studies, community involvement, place attachment, civic engagement, political participation

The concept of "community networks" refers to a digital tool, serving as a local medium for a "proximate" or geographical community, responding to the needs of the community and its residents (Carroll & Rosson, 2003). This concept emphasizes the geographic

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aspect of a shared place of residence and refers to an electronic space of information and communication operating within a geographically based community (Kavanaugh, Carroll, Rosson, Reese, & Zin, 2005; Kavanaugh, Carroll, Rosson, Zin, & Reese, 2005; Shah, Cho, Eveland, & Kwak, 2005; Wellman, Haase, Witte, & Hampton, 2001).

In recent years, there has been a rising interest in community social capital. Social capital is defined as all those resources, real or virtual, accessible through direct and indirect social connections (Lin, 2001). Community social capital includes social networks that are active in the local community, including the material or symbolic resources flowing in those networks (Brown, 2002; Nahapiet & Ghoshal, 1998; Putnam, 2000). One important manifestation of social capital in the community is participatory social capital, referring to participation in locally based organizations that conserve and promote the quality of life (Mesch & Schwirian, 1996). As the Internet provides an electronic space for accessing information and social interaction, the role of the Internet in the creation and access to community social capital requires research attention.

The rapid adoption of the Internet has resulted in academic interest in the role of the use of digital technology in the development of a sense of community (Borgida, Sullivan, Oxendine, Jackson, & Riedel, 2002; Carroll & Rosson, 2003; Hampton, 2007; Matei & Ball-Rokeach, 2003; Mesch & Levanon, 2003). Comparing major attributes and implications of face-to-face and virtual communities, Etzioni and Etzioni (1999) argue that the proper combination of both face-to-face (FTF) community and online community holds more promise in meeting the requirements of a community than each of them could separately, whereas others believe that online communities provide the potential for revitalizing community by dramatically reducing the costs of distance and time, thus allowing individuals to exchange more views with many more others (Cleveland, 1985; Doheny-Farina, 1996; Hague & Loader, 1999).

A key distinction between online communities and a community network is that the former is based entirely on computer-mediated communication, on transcending geographic boundaries, and on narrow shared personal interests. A community network, by contrast, is embedded in proximate geographic relations and members are already part of the same locally based community, also having FTF interaction, and membership is based on shared local concerns (Kavanaugh, Carroll, Rosson, Reese, & Zin, 2005; Kavanaugh, Carroll, Rosson, Zin, & Reese, 2005).

This article examines the effect of participation in locally based electronic networks in two Israeli communities on community civic engagement and on community sense of belonging among the residents. More specific, we use a longitudinal design to decompose the causal effect of Internet use and other forms of community social capital on community involvement and community attachment.

Contributions of Community Networks

In community networks, members of a geographic community send electronic messages, providing and requesting information from other residents on everyday issues such as location of groceries and finding a ride and baby-sitter to more community-oriented

issues such as participation in local organized activities and associations. Two of the major potential contributions of community networks for proximate communities are (a) increasing community social capital, as community networks promote membership in civic organizations, locally based activities, and social interactions among citizens; and (b) enhancing residents' attachment to their local communities and neighbors through these collective actions (Borgida et al., 2002; Carroll & Rosson, 2003).

Most of the studies of community networks have focused on how the Internet affects local and community social integration and involvement in local activities and networks. One line of research is based on a media perspective, in which the Internet is seen as part of the community media system supplementing existing sources of information (such as newspapers and television). In this perspective, the role of the media is to provide an infrastructure of "story telling." Institutions, newspapers, networks, and the Internet provide stories about the place and these stories activate neighbors' narratives, serving as a bridge between macro social institutions, community networks, and individuals. According to this "connectivity hypothesis," when people read the newspaper, talk with their neighbors, watch television, or use the Internet, they tend to do more than merely acquire local information for personal use, but connect to a community that is larger than the sum of its parts (Matei & Ball-Rokeach, 2003).

This perspective is based on the concept of "media complementarity," implying that media use reflects existing social patterns. At the community level, the implication is that the Internet is an additional channel of communication that is used together with newspapers and television to search for nonlocal and local information (Stamm, Emig, & Hesse, 1997). Thus, individuals who are interested in local issues use media (including the Internet) for community-related purposes. The expectation is that Internet use will be positively associated with participation and attachment because the Internet is used as a resource of local information (Dutta-Bergman, 2006). Internet connection is viewed as an integral part of media consumption, molding residents into a community through shared exposure to local and nonlocal information that translates into connectedness to the local community. However, the empirical evidence for this connectivity argument is mixed. Studies that compared differences in community involvement of citizens with and without access to the Internet found small, positive effects. A cross-sectional study of seven ethnic neighborhoods in Los Angeles found that residents having an Internet connection were more likely to be members of community organizations and reported a higher perception of community belonging (Matei & Ball-Rokeach, 2003). Nevertheless, it seems that the integration of the new media in community life was conditional. The effect of the Internet on community belonging among ethnic minorities was found to be connected with community disengagement. More to the point, the positive effect of the Internet on community belonging was restricted only for those already having resources in the mainstream community (Matei & Ball-Rokeach, 2003).

In another study, Hampton and Wellman (2003) found that Internet connection was mainly used for local communication and that those residents who had Internet connection reported knowing more neighbors than those who did not. Kang and Kwak (2003) conducted a multilevel analysis of communication variables on civic-related citizenship,

controlling for neighborhood characteristics such as residential stability. They found that media use (in particular, reading newspapers and watching television) was positively related to participation in civic activities. Yet, among those living in a neighborhood with lower residential mobility, time spent watching television tends to be negatively related to civic engagement among those whose residence in a community is shorter. In addition, the effect of Internet connection on civic participation was much smaller than the effect of print and broadcasting media. The influence of communication variables on civic community participation had interactive effects with community-level and individual-level variables. More specific, the effect of communication variables on civic-related behavior was affected by community variables, such as residential stability, and individual residential length.

In the same vein, a longitudinal study of a small sample of residents in Blacksburg Electronic Village tested the effect of Internet connection on individuals' involvement in the local community (Kavanaugh, Reese, Carroll, & Rosson, 2003). The results of this study showed that the Internet served as a tool for enhancing social relations and information exchange and increasing FTF interaction. This is especially valid for individuals with higher levels of education, extroversion, and age. More important, social capital variables, sense of collective political efficacy, organizational membership, and community belonging were significant mediating variables, explaining variance in community activism and in using the Internet for social purposes. The study also found that community activism and social Internet use were significant in explaining variance in the overall community involvement (Kavanaugh et al., 2003).

From these studies, it is difficult to conclude that there is an Internet effect on civic engagement and community attachment. An alternate explanation is that residents involved in local activities are also the first to get connected to the Internet. After being connected, these early adopters are most likely to use the Internet for accessing local information and participating in locally based activities (Dutta-Bergman, 2006). Furthermore, it is very likely that Internet effects are conditional on the type of Internet use (Kavanaugh, Carroll, Rosson, Reese, & Zin, 2005; Kavanaugh, Carroll, Rosson, Zin, & Reese, 2005; Shah, McLeod, & Yoon, 2001). For example, a study that compared print, broadcast, and Internet effects on interpersonal trust and civic participation reached the conclusion that only informational uses of media are positively related to the production of community social capital, whereas social and recreational uses are negatively associated with community social integration (Shah, Kwak, & Holbert, 2001; Shah, McLeod, & Yoon, 2001).

It is very likely that the mixed results are the result of conceptualizing the Internet access as a binary variable: individuals are either connected or disconnected from the Web. The assumption of the connectivity perspective, that is, connection to the Internet in itself and by itself increases the likelihood of communication and community participation, is insufficient for explaining observed results, because it does not directly measure the mechanism that links Internet use to community involvement and participation. Thus, what is missing from these studies is an investigation of the linking mechanisms between Internet connectivity and local participation.

Some residents might use the technology for nonlocal uses such as searching for nonlocal information and connecting to nonlocal significant others, whereas the ones

using media for acquiring local information and connections might be the ones to acquire local social capital.

In our study, we had the opportunity to directly test a participation explanation, in which we assume that Internet connection is a precondition for online participation in community life. In doing this, we had purposely gathered data from residents of two communities that have a local bulletin board, allowing us to compare the ones using the Internet for local purposes with the ones who do not (and are not members of the bulletin board).

According to our participation hypothesis, Internet connectivity provides access to the opportunity structure for acquiring local information and for participation. For example, those who are interested in mobilizing collective action, petitions, or organizational meetings would find it much easier and cheaper to mobilize attention and individuals on the Internet. A local community network serves as a public virtual arena. Moreover, those seeking information and assistance in everyday community life may find it easier to exchange information and experience in chats and virtual forums on other collective issues. Using the local community network as a communicative platform may encourage spillover of multiple issues of discussion in community public life. Surely, social interaction is a precondition to translate this potential effect of the electronic space to community involvement. Thus, according to the participation hypothesis, we expect that, over time, the effect of local Internet use on civic participation and local attachment will be positive.

Recently, the E-neighbors project started addressing some of the research limitations noted above. Hampton (2007) conducted a study of four neighborhoods in the Boston area in which not only was an Internet connection provided but also participation in a local neighborhood discussion list, a neighborhood Web site, and two systems that provided online infrastructure for local interaction, communication, and story telling. Participants in the neighborhood Web sites reported, over time, an increase in the size of their local social networks, although changes in the number of their close ties were not observed. The Internet connection provided the structural conditions for participation with the result that residents who participated increased their number of weak tie contacts (Hampton, 2007).

Our study follows and expands this line of research. Using a longitudinal survey of suburban residents in Israel, we investigate the connectivity hypothesis and the participation hypothesis. Following previous studies, we expect that Internet connectivity is not enough for the enhancement of local participation. Internet connection provides the opportunity for participation in local electronic boards and it is this participation that enhances participation in locally based activities and community attachment.

The following section describes the design, variables, methodology, and findings of the study.

Data and Method

This article presents the results of a longitudinal study conducted in two suburban communities in Israel. The suburban communities were chosen after we identified the

existence in both of them of an electronic bulletin board that was created by the residents. Both electronic bulletin boards are very active, and residents post information on community activities, requests for help and services, and opinions on the community. The existence of the bulletin boards is known to the residents and their membership is quite high. In a previous study, the characteristics of the suburban communities and bulletin boards have been described in detail (see Mesch & Levanon, 2003).

Ramat Beit-Shemesh and Modiin are both relatively new communities built in the past 15 years, located in the Jerusalem periphery. The population of Ramat Beit-Shemesh is homogeneous, composed mainly of recent immigrants from English-speaking countries who maintain an orthodox religious lifestyle and have families with young children. The Modiin population likewise includes families with young children, and they conduct secular or religious lifestyles. The mailing lists in both places were established around 1995, at the initiative of a few residents, without the help or involvement of any external agency, including the local government. Both produced 20 messages a day on average. Their purposes were defined as sharing information among residents, providing information to prospective residents on the location of facilities in the community, and supporting local businesses and community services. Messages in both lists are posted in English. A content analysis of a random sample of 1,190 messages posted to the list from 401 e-mail addresses revealed the distribution of the messages according to their content. It was found that 30.4% of the messages refer to consumption (residents selling furniture or appliances and residents interested in buying furniture or appliances). The second most frequent category, 19.7% of the messages were on household aid (residents providing information on job openings, lending household items, and rides to major cities). Residents use the list to express their opinion on local issues and 23% of the messages contained views on the local government, city development, and planning. Another category included messages providing information on organized local, social, and cultural activities and 16% provided information on upcoming conferences, music, and theater performances. Finally, about 10.5% provided information on local schools and advice on parenting.

In both communities, a sample framework was created. Using the list of electronic board members, interviewers were sent to conduct a FTF interview with board members and to randomly choose one neighborhood member who was not a member of the electronic bulletin board, thus matching a member of the electronic board with one of the neighbors. Data were collected at two points in time. The first wave of data collection took place during the months of January to July 2005. Interviews were conducted FTF at the respondent residence and a total of 450 individuals participated. The second wave of data collection took place during the months of May to August 2007. In the second wave of data collection, only 225 individuals from the original study participated for an attrition rate of 50%.

In a panel study, sample attrition can bias the results. In this study, the attrition rate between waves 1 and 2 was 50% (a decrease from 450 to 225 respondents). We conducted a widely accepted test (Miller & Wright, 1995) to detect attrition bias. A method for detecting differences in respondent characteristics is Logit analysis (Miller &

Wright, 1995). A Logit equation was conducted to estimate the probability that every first-wave respondent would participate in the second wave. In this model, we created a dummy dependent variable indicating the individual's participation in the second wave (0 = nonparticipation, 1 = participation). The results provide an estimate of the effect of each independent variable on the likelihood of participation in the second wave, with statistically significant parameter estimates for any of the central variables in this study indicating the presence of attrition bias. The Logit analysis revealed no statistical significance for any of the studies. We concluded that the second wave of data collection was not affected by attrition bias.

We used a conditional change panel model to test the hypotheses. The model included lagged dependent and independent variables and controlled for previous levels of the independent variables. The inclusion of the lagged dependent variable as a predictor of the values of the dependent variable controlled for the original levels and took into consideration the regression to the mean effects (Finkel, 1995; Kessler & Greenberg, 1981).[1]

Variables Definition

List member was measured with an item that asked the respondent if he or she is a member of the electronic bulletin board. A positive response was coded 1 and a negative response was coded 0.

Internet access is a question in which respondents were asked whether they have an Internet connection at home. A positive response was coded 1 and a negative one was coded 0.

Attitudes to technology were measured with a scale that included six items. Respondents were asked the extent of agreement with the following items: "I am very skilled at using computers," "Using computers is fun," "Computers can help bring the local community together," and "Having a computer gets me in touch with people." Responses were indicated on a Likert-type scale, where 1 was *complete disagreement* and 5 *high agreement*. A factor analysis (varimax rotation) found that the items represent a single dimension. Items were combined in a single scale by adding the responses to the items ($\alpha = .82$).

Norms of generalized reciprocity is a scale that was measured using nine items. The items measured the extent that respondents report listening to their neighbors' problems and providing help as well as being listened to by their neighbors and getting help from them in different areas such as shopping and watching the house. Answers were on a 5-point Likert-type scale from *not at all* to *many times*. In an explorative factor analysis, the items resulted in one dimension and were combined, summing up the responses into a single scale ($\alpha = .76$).

Neighboring was measured with a single item that asked the respondents how many neighbors they have talked to in the past week.

Community activities: Individuals were asked whether they participated in the activities of 18 different local organizations such as Parent Teacher Association, local synagogue, crime prevention group, and local political groups. Responses for each

item were coded 1 for yes and 0 for no. A scale was built summing the answers to all the items for each respondent.

Organizational membership: From a list of 18 different local organizations, individuals were asked to indicate if they were active members. Responses for each item were coded 1 for yes and 0 for no. A scale was built summing the answers to all the items for each respondent.

Community attachment was measured using four items that asked about the extent of agreement or disagreement with the following statements: "I'm proud to live in this locality," "I feel an obligation to make a contribution to my locality," "If others in my locality wanted to do something to improve our place, I will be willing to work with them," and "I will be sorry to leave the locality." Responses were given on a Likert-type scale where 1 indicated *lack of agreement* and 5 *high agreement*. The items were found to represent a single dimension using a factor analysis and were combined into a single scale ($\alpha = .75$).

All the variables were measured in both waves of data collections, thus we have a baseline and change score for each measure.

Results

Demographics

In the study, 74% of the respondents were women and, on average, respondents were 37.41 years old; 91% were currently married, 85% were homeowners, and the mean length of residence in the community was 6.7 years. Table 1 presents the descriptive statistics of the study participants.

Study participants report being involved in the community. On average, they report that they have talked with seven neighbors during the past week, being members in two local organizations, and participating on average in five organized local activities.

Internet access was slightly above the national average: 79% reported access to the Internet, compared with the national level of 72%. An important finding from the descriptive statistics is that whereas 79% have Internet access, only 52% report being a member of the locally based electronic forum.

Given the central interest of this study on the effect of participation in the local bulletin board, the next step of the analysis was directed to identifying the characteristics that predict change in list membership over time.

Table 2 presents the results of a logistic regression analysis predicting changes in the likelihood of membership in the community electronic forum. The findings highlight the importance of technological factors over residential factors. When controlling for initial levels, change in Internet access has a positive effect on membership in the local list. The results indicate that Internet connectivity represents an exposure factor, and it is not surprising that it is associated with membership in the electronic forum. But exposure by itself is not enough, and positive attitudes to technology have an important effect. Change in attitudes to technology increased the likelihood of membership in

Table 1. Descriptive Statistics of Participants in the Study

	Average	Range
Age	37.41 (9.85)	18–80
Gender (male = 1)	0.26 (0.44)	0–1
Number of children younger than 18	3.09 (1.94)	0–11
Length of residence	6.70 (6.21)	1–50
Home ownership	0.85 (0.36)	0–1
Household income	6.0	1–10
Educational level	4.86	1–8
Marital status (1 = married)	0.91 (0.27)	0–1
Internet access	0.79 (0.40)	0–1
Local electronic bulletin board membership	0.52 (0.50)	0–1
Number of neighbors talked with past week	7.20 (6.83)	0–50
Membership in local organizations	2.11 (1.60)	0–8
Activities in local organizations	5.35 (2.92)	0–15
Norms of reciprocity	17.12 (4.00)	4–30

Table 2. Results From a Logistic Regression Predicting Membership in the List

Odds Ratio	*SE*	Beta	
0.969	0.026	–0.032	Age
1.42	0.47	0.35	Male
3.07	0.86	1.12	Married
1.42	0.21	0.35	Educational level
1.04	0.06	0.04	Length of residence
0.41	0.65	–0.88	Internet access t1
2.32*	1.44	3.14	Internet access t2
0.98	0.04	–0.01	Attitudes to technology t1
1.10*	0.04	0.09	Attitudes to technology t2
12.9*	0.56	2.56	List member t1
0.02	2.16	–6.11	Constant
		0.32	Adjusted R^2
		146.39	–2 log likelihood

*$p < .01$.

the local list. An important finding is the statistically significant effect of being a list member at time 1. This result indicates that members tend to stay and not to drop out their membership. Thus, the results show that the combination of connectivity and attitudes increases the likelihood of being a member in the electronic forum. At the same time, it is important to note that sociodemographic variables were found not to be related to membership in the forum. It is very likely that age, gender, and educational level are associated with Internet access, but once individuals have access and positive attitudes to technology, sociodemographic variables do not have an effect.

Table 3. Ordinary Least Squares (OLS) Membership in Local Organizations

Beta	*SE*	*B*	
.16**	.006	.020	Age
–.07	.13	–.20	Male
–.05	.21	–.23	Married
.02	.03	.01	Children younger than 18
.01	.05	.01	Educational level
–.01	.00	–.01	Length of residence
			Total household income
.08	.15	.25	Internet access t1
–.01	.37	–.09	Internet access t2
.04	.01	.01	Reciprocity t1
.13**	.02	.07	Reciprocity t2
.05	.01	.01	Talking with neighbors t1
.07*	.01	.01	Talking with neighbors t2
.02	.01	.06	Attitudes to technology t1
.02	.01	–.05	Attitudes to technology t2
.10*	.14	.26	List member t1
.22**	.19	.89	List member t2
	.88	–1.30	Constant
		.186	Adjusted R^2

*$p < .10$. **$p < .05$.

Connectivity and Civic Engagement

What are the consequences of participation in the electronic bulletin board? In the next section of the analysis, we present the results for the effect of Internet connectivity and membership in the local bulletin board on community involvement and engagement, namely, membership in local organizations, participation in community activities, and attachment to place.

Table 3 presents the results for organizational membership. The findings show that age is positively associated with membership in local organizations but other demographic characteristics of the respondents such as gender, marital status, and educational level are not. Internet access and attitudes to technology did not have a statistically significant effect on membership in local organizations. Reciprocity, a scale that measures the extent that individuals ask for and receive help from their neighbors, was positively associated with membership in local organizations, indicating that resources exchange with neighbors in the community motivates participation in local organizations. Respondents who are members of the electronic bulletin board were found to report a higher membership in local organizations than respondents who are local residents but not members of the electronic bulletin board. Thus, according to the findings, it is not Internet connectivity, per se, but membership in the locally based electronic board that is positively associated with membership in local community organizations.

Table 4. Ordinary Least Squares (OLS) Regression Predicting Participation in Community Activities

	B	*SE*	Beta
Age	.002	.009	.013
Male	−.149	.174	−.042
Married	.057	.292	.010
Number of children	.021	.040	.026
Education	.116	.073	.084
List member 1	.137	.185	.044
List member 3	.707	.260	.142*
Internet access t1	.079	.210	.020
Internet access t2	.188	.516	.019
Talking with neighbors t1	−.004	.013	−.016
Talking with neighbors t2	.009	.007	.061
Attitudes to technology t1	−.07	.02	.01
Attitudes to technology t2	.02	.03	.03
Constant	3.024	.73	
R^2	.05		

*$p < .01$.

Membership in locally based organizations appears to be dependent on other aspects of social involvement. Having reciprocal relationships with neighbors and talking with neighbors are important in becoming a member of a locally based organization. In that sense, it seems that Internet connectivity is an important condition for being a member of an electronic forum, yet the structural factors conducive to community involvement by being a member of organizations are, in turn, associated with neighboring and with being a member of the electronic bulletin. It seems that membership in the electronic forum is just a form of reinforcing previous neighboring relationships.

Table 4 presents the results for participation in locally based activities. The only statistically significant variable is membership in the community electronic forum. Sociodemographic characteristics are not statistically significant. In addition, having Internet access and relations with neighbors did not result in statistical significance.

The final question of interest in this study is the extent that membership in the local community bulletin board has long-term effects on the willingness of residents to continue residing in the local community over and above the effect of demographic variables on sentiments toward the community. For this reason, we conducted an ordinary least squares (OLS) regression analysis predicting community attachment.

According to the results that are presented in Table 5, age and gender are not statistically significant, indicating that there are no differences on reported sentiments to the community between old and young, female and male community residents. Yet, education and number of children were statistically significant. The higher the education, the higher the reported willingness to continue residing in the community. Involvement

Table 5. Ordinary Least Squares (OLS) Regression Predicting Community Attachment

Beta	*SE*	*B*	
0.097	0.024	0.044	Age
0.46	0.75	0.076	Male
0.080	0.778	1.276	Married
0.03	0.02	0.015	Length of residence
0.10*	0.225	0.099	Number of children
195*	0.375	0.096	Education
0.09	0.49	0.86	List member t1
0.09*	0.69	1.36	List member t2
0.55	0.722	0.066	Internet access t1
0.0127	1.37	0.473	Internet access t2
0.03	0.03	0.02	Neighbors talk t1
0.12**	0.01	0.05	Neighbors talk t2
–0.06	0.04	–0.04	Attitudes to technology t1
0.25	0.06	0.01	Attitudes to technology t2
0.18*	0.03	0.13	Attachment t1
	0.19**	27.8	Constant
0.13			Adjusted R^2

*$p < .01$. **$p < .05$.

in the local community was found to be important in the prediction of community attachment. It was found that the higher the number of children, the higher the positive sentiments to the community. Families with children are usually involved in the local community as their children attend the local schools and participate in extracurricular activities. An additional measure of involvement in the community is participation in local networks. Residents who talked with their neighbors in the past week report higher levels of community attachment. Finally, even when considering number of children and number of neighbors whom the respondent talked to, membership in the local bulletin board increases the level of community attachment reported.

The results of this model indicate that involvement in the local community, measured using a proxy (i.e., number of children), a FTF measure (i.e., talking with neighbors), and an online measure (membership in the bulletin board), is the most important factor predicting sentiments to the local community.

Discussion

This study was designed to examine the effect of connectivity and electronic participation on community involvement and attachment. Previous studies on the effect of the Internet on community participation and sentiments have been limited as they have typically used a cross-sectional methodology and measured only the effect of connectivity. The use of cross-sectional methodologies cannot control for the possibility of

sample selection bias, in which highly educated, community active individuals are also more likely to have Internet access. In some aspects, this is the central assumption of media complementarity that, taking a social constructivist perspective, understands the use of local media as reflecting previous community commitments. Our longitudinal study allows us to empirically test this assumption, modifying it to testable hypotheses, and our results imply that controlling for previous community variables, membership in the locally based electronic space has a statistically significant effect on community involvement and place attachment. It is precisely because this study used a longitudinal methodology that it was possible to control for initial levels and to disentangle the directionality of the effects, overcoming sample selection bias, which had prevailed in previous studies.

Local Internet use is a guard against privatization of community life. Yet, this hedge is not technologically deterministic. Our findings strongly support our argument that it is not Internet connectivity per se that increases community involvement but, rather, a new venue of community participation, as connectivity facilitates participation in locally based bulletin boards. In other words, connectivity provides the opportunity for local participation, but the membership in the bulletin board provides the most important effect on community participation and attachment. In return, the effect of Internet connectivity on community social capital is affected by the initial stock of residents' social capital.

The results indicate that Internet access and positive attitudes to technology are a critical factor in the understanding of membership in the electronic bulletin board. This result demonstrates the importance of promoting locally based electronic boards as a public space of community information exchange, social support, and sociability. Furthermore, the results show that community participation requires intervention, designed for decreasing the still persisting digital divide, as residents lacking Internet connection are deprived of part of the local opportunity structure for participation.

In addition, the findings' consistency indicates that once residents have access, it is membership in the bulletin board that increases the likelihood of association with locally based organizations and higher levels of community attachment. As we did not measure the extent of actual online activity carried out by the electronic board's members, the effects we have presented here are conservative. Thus, they indicate that the mere enrollment in the bulletin board becomes a source of formation and extension of social capital, apparently increasing the size of locally based social networks and norms of reciprocity.

Our findings have implications for understanding of community social capital in the information society. As the Internet is integrated in the everyday lives of individuals and is adopted as a community system of information and communication, it has a role in access to community social capital. Future studies should be directed to understanding of this mechanism. In other words, studies should examine the effect that active versus passive participation in the locally based electronic bulletins has on the formation of social capital at the local level. For example, studies could explore the question of whether "lurkers" enjoy access to social capital more, less, or the same as

active participants. In addition, future studies should carefully examine the linkage between digital community, online participation, social networks, and social capital at the individual and community levels of analysis.

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Note

1. Introducing raw and the lagged values of the independent variables has proven appropriate for studying individuals' psychological well-being (Kessler & Greenberg, 1981) because it is reasonable to assume that stressful events can have an effect on an individual's well-being and that events such as discrimination may have some lingering direct effects on psychological health and well-being (Finkel, 1995).

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