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Information and Expression in a Digital Age

Modeling Internet Effects on Civic Participation

This article examines the role of the Internet as a source of political information and a sphere for public expression. Informational media use, whether traditional news sources or online public affairs content, is expected to foster interpersonal political discussion and online civic messaging, contributing to increased civic participation. Using two-wave national panel survey data, three types of synchronous structural equation models are tested: cross sectional (relating individual differences), fixed effects (relating intraindividual change), and auto regressive (relating aggregate change). All models reveal that online media complement traditional media to foster political discussion and civic messaging. These two forms of political expression, in turn, influence civic participation. Other variable orderings are tested to compare the theorized model to alternative causal specifications. Results reveal that the model produces the best fit, empirically and theoretically, with the influence of the Internet, rivaling the mobilizing power of traditional modes of information and expression.

Keywords: *civic engagement; computer-mediated communication; interpersonal discussion; media effects; political participation; social capital*

Political communication research has demonstrated that news media consumption and interpersonal political discussion play important roles in civic participation (McLeod et al., 1996; Shah, McLeod, & Yoon, 2001). News media provide a resource for political discussion and create opportunities for

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exposure to conflicting viewpoints, encouraging political talk that might not otherwise occur (Mutz, 2002a; Mutz & Martin, 2001). In turn, political discussion raises awareness about collective problems, highlights opportunities for involvement, and thereby promotes civic participation (Kwak, Williams, Wang, & Lee, 2005; McLeod, Scheufele, & Moy, 1999). From this perspective, news consumption and interpersonal discussion are not competing but complementary factors that both have the potential to produce civic participation (Chaffee, 1972; Chaffee & Mutz, 1988).

The rise of the Internet substantially expands and complicates this process and with it the logic of collective action (Davis, 1999; Galston, 2000). In contrast with traditional media, the Internet provides a source of political information and a sphere for political expression (Dahlgren, 2000; White, 1997), both of which would seem to support civic engagement. As Lupia and Sin (2003) assert, however, "optimistic appraisals overlook the possibility that evolving technologies can make some collective endeavors harder to maintain or easier to destroy" (p. 316). Accordingly, research must examine whether these online behaviors complement traditional news media use and political talk to promote civic participation or simply create the impression of communicative action without the tangible benefits that come from small-group interactions (Bimber, 1999, 2001; Cornfield, 2000; Olson, 1965).

Indeed, some scholars contend that Internet use erodes social connections through time displacement and social withdrawal (Kraut et al., 1998; Nie & Erbring, 2000), though these claims have typically been based on research that addresses how much citizens use the Internet instead of how they use it. We argue that scholars must attend to particular patterns of Internet use, especially those that encourage learning and dialogue, to understand how new technologies exist alongside traditional modes of gaining information and expressing opinions. Furthermore, we argue that information seeking and citizen expression online complement their offline counterparts, leading to civic participation in much the same way that traditional forms of news consumption and interpersonal discussion have been found to shape levels of engagement.

To examine these assertions, we rely on national data from a two-wave panel survey around the election of 2000. We theorize a causal model of Internet effects on civic participation and then investigate the role of the Internet as both a source of information and a sphere of political expression above and beyond traditional modes of news surveillance and political talk. We examine our theory by testing three types of synchronous structural equation models: (a) cross sectional, relating individual differences in Wave 1; (b) fixed effects, relating intraindividual change between Wave 1 and Wave 2; and (c) auto regressive, relating aggregate variation between Wave 1

and Wave 2. Each of these approaches has strengths and weaknesses that are counterbalanced by the others. Alternate orderings of the variables are also tested to compare our model of effects to different causal specifications. This model comparison approach provides a demanding test of our theory of effects.

Literature Review

Media and Community Life

Political scientists and sociologists have long debated how information and experience intersect to produce civic engagement (Almond & Verba, 1963, 1980; Coleman, 1990; Habermas, 1979; Inglehart, 1997; Taylor, 1989; Tönnies, 1940). In recent years, Putnam (1993, 1995a, 2000) has popularized the term social capital to describe how basic elements of community life such as interpersonal trust and communication networks provide the means for citizens to cooperate on joint problems. Defined by some as "the resources of information, norms, and social relations embedded in communities that enable people to coordinate collective action and to achieve common goals" (Shah, McLeod, et al., 2001, p. 465), social capital is an inherently multilevel construct that acknowledges the importance of individual and interpersonal factors.

Social capital research, despite its multilevel conceptualization, has concentrated on individuals as the unit of analysis, typically using sample surveys to measure citizens' levels of social and civic engagement (Brehm & Rahn, 1997; Shah, 1998; Uslaner, 1998). Social network variables are represented through individuals' reports of their discussion networks in terms of size, heterogeneity, and frequency of talk (McLeod et al., 1999). For the purposes of this inquiry, we focus on civic participation as an important individual-level indicator of social capital (Brehm & Rahn, 1997; Erickson & Nosanchuk, 1990; Sullivan & Transue, 1999; Uslaner, 1998) and consider the informational and interpersonal factors that influence its production. In this framework, civic participation represents a critical behavioral marker of community engagement and integration. It plays a central role in the health and functioning of democratic societies by channeling collective action toward community building. The experience of participating in community and voluntary work also reinforces norms of reciprocity, encouraging faith in others (Ostrom, 1990). By supporting these norms, participation begets future participation.

Notably, scholars focusing on the erosion of civil society also have advanced civic participation as a critical indicator of democratic health. For example, Putnam (2000) asserts that civic engagement as seen in club

memberships, work on community projects, and attendance at neighborhood meetings has slipped markedly in the past 30 years, contributing to the erosion of community life. Aggregate changes in media adoption and use (e.g., rising rates of television usage and declines in newspaper readership) are Putnam's culprits for the downward trajectory of these indicators of civic culture. Time spent with media supposedly privatizes leisure time and therefore displaces other activities that build the community (Putnam, 1995b; cf. Moy, Scheufele, & Holbert, 1999). Furthermore, the depiction of social reality in mass media, particularly televised violence, is thought to cultivate a perception of a so-called mean world, further leading to social withdrawal (Gerbner, Gross, Morgan, & Signorielli, 1980; cf. Hawkins & Pingree, 1981).

Some of these arguments have been extended to the Internet. Kraut et al. (1998) assert that "like watching television, using a home computer and the Internet generally implies physical inactivity and limited face-to-face social interaction" (p. 1019; see also Vitalari, Venkatesh, & Gronhaug, 1985; cf. Kraut et al., 2002). Their longitudinal analysis concludes that heightened use of the Internet erodes communication with family and friends. Similarly, Nie (2001) relates increases in time spent online with decreases in time socializing and attending events outside the home, leading to the conclusion that when preexisting differences are taken into account, Internet use causes people to lose touch with their social environment.

Yet all of this research can be critiqued on the grounds that it fails to consider distinct patterns of people's media use, focusing instead on volume of usage. Given the considerable informational potential of mass media and the expressive potential of the Internet, this approach likely leads to erroneous conclusions about media effects on civic engagement. Some consideration of the varied functions and uses of media is clearly needed.

Consuming Information

Motivational perspectives on media uses and effects recognize that individuals actively choose to attend to particular types of content and expect to gain certain gratifications as a result of these interactions (Blumler & Katz, 1974; Katz & Gurevitch, 1974; Rosengren, Palmgren, & Wenner, 1985; Swanson, 1987; Zillmann & Bryant, 1985). Research on print and broadcast media and more recently on the Internet has discovered regular patterns of consumption and fulfillment that contrast information and surveillance motives for media use with the entertainment and ritual functions they serve (Graber, 1993; McQuail, 1985, 1987; Norris, 1998; Shah, McLeod, et al., 2001; Zillmann, 1985). In particular, informational motives for media use have received considerable attention from scholars interested in civic engagement

because they indirectly promote increased political knowledge (e.g., Eveland, Shah, & Kwak, 2003) and awareness of civic opportunities and objectives.

The general conclusion of this research is that informational uses of the mass media, whether reading newspapers, watching news programs, or gathering and exchanging information through the Internet, have procivic consequences. For example, Norris (1996) finds support for her claim that televised news and public affairs programming is beneficial to the health of democratic society. Her analysis indicates that viewing informational programming contributes positively to a wide range of participatory behaviors. Likewise, research by McLeod et al. (1996, 1999) has demonstrated that newspaper reading and local news viewing are related to civic participation at the community level, where individuals can use the information they acquire to reflect and deliberate about issues. Such uses of mass media, then, do more than educate; they provide the basis for political discussion that can lead to civic action.

Of course, newspapers and television are not the only media that serve surveillance functions. Research suggests that informational uses of the Internet encourage community involvement and foster civic participation (Norris, 1998; Shah, McLeod, et al., 2001). That is, individuals who use the Internet to explore interests, gather news, and exchange ideas have been found to be more socially and politically engaged (Shah, Kwak, & Holbert, 2001). The Internet may promote civic engagement partly because of its flexibility in that it allows users to access information on demand, receive news in a timely manner, learn about diverse viewpoints, customize content to suit their interests, and go into greater depth about issues of importance (Davis, 1999; Jones, 1995; Rheingold, 1993). This flexibility should make those who come to the Internet with informational motivations more able to achieve the gratifications they set out to gain. These people may be well equipped to communicate with others about politics, increasing opportunities to deliberate about issues, express their views publicly, and recruit people into civic life.

Citizen Communication

Recent research indicates that communication among citizens largely mediates the effects of news consumption on civic engagement (McLeod et al., 2001; Sotirovic & McLeod, 2001). McLeod et al. (2001) and Sotirovic and McLeod (2001) organize these antecedents of participation into what they term a "communication mediation model," theorizing and then testing both the interrelationship among these variables and their direct and indirect effects on participatory behaviors.[2] According to this model, the effects of media on participation are strong but mostly indirect. Informational uses of

media influence participation through their effects on discussion and reflection about politics.

One of the strengths of this model is the integration of mass and interpersonal communication into the processes that result in political participation, as previously demonstrated by Huckfeldt and Sprague's (1995) study focusing on social communication. In particular, frequency of political talk with family and friends has been highlighted as a key variable in a chain of communication effects on civic engagement. The assumption is that individuals who discuss politics frequently are exposed to a wider range of political perspectives, and this exposure increases their interest in politics, their opinion quality, and their social tolerance (Mutz, 2002a). However, analyses of these relationships have not considered the role of interactive messaging via the Internet—a vital domain of exchange—for civic activism.

The communicative potential of the Internet also permits the sharing of political perspectives and concerns with others through interactive messaging technologies such as e-mail, instant messaging, electronic bulletin boards, online chats, and feedback loops to news organizations and politicians (Price & Cappella, 2002). In less than a decade, the expressive potential of the average citizens has been transformed; individuals are now in a position to "post, at minimal cost, messages and images that can be viewed instantly by global audiences" (Lupia & Sin, 2003, p. 316). As such, the Internet may provide a counterpoint to the collective action advantages attributed to small, face-to-face groups. On the other hand, those who have conducted content analyses of the major sources of online political discussion, including chat rooms and discussion boards, have been less sanguine about their potential (e.g., Hill & Hughes, 1998). For instance, Wilhelm (2000) refers to the political newsgroups he studied as cyberwastelands (p. 97), and Gregson (1998) concludes that they are comprised not of true discussion but of sequential monologues. But, content studies are insufficient to infer effects; it may be that discussion regardless of the nature of the discussion can stimulate participation.

Online communication about politics may not only permit citizens to gain knowledge but also allow them to coordinate their actions to address joint concerns (Bimber, 1998; Davis, 1999; Norris, 1998). In particular, the associative features of e-mail may amplify these effects because they readily allow such a large number of individuals to share their views with many people simultaneously. Civic messaging via e-mail may also permit people to encounter opportunities for civic engagement and organize community activities (Corrado & Firestone, 1996; Pavlik, 1996). This may be spurred by exposure to information via media, indicating how news seeking may work

through interactive messaging to encourage participation about publicly debated issues.

Theoretical Model

Although research on communication and community life has begun to clarify the linkages between patterns of media use and civic participation, few studies have simultaneously considered the effects of print, broadcast, and Internet variables. Extant research on the influence of certain media classes is clear: Newspaper reading and broadcast news viewing have repeatedly been linked with civic engagement (McLeod et al., 1996, 1999; Norris, 1996). Likewise, online information seeking appears to influence participation (Jennings & Zeitner, 2003; Shah, Kwak, et al., 2001; Wellman, Haase, Witte, & Hampton, 2001).

Recent research also finds that communication among citizens may be a critical intervening variable between news consumption—and possibly online information seeking—and civic engagement (McLeod et al., 2001; Sotirovic & McLeod, 2001). We advance this notion and predict that media effects will be related to two forms of citizen communication: interpersonal political talk and interactive civic messaging. That is, use of print, broadcast, and online media sources for news and information may encourage political discussions with friends and family and increase the likelihood of communicating about civic life via the Internet.

This is not to suggest that we expect media to have no effects on civic engagement; rather we predict informational uses of media will directly influence these interpersonal discussion and interactive-messaging variables, which in turn may shape levels of civic participation. A sizable body of research has highlighted the importance of the frequency of political talk for political participation (e.g., Kwak et al., 2005). We assume that interpersonal discussion about civil society and political issues has a number of positive consequences for civic life including contact with diverse perspectives, opportunities for issue deliberation, and exposure to civic resources and recruitment. Interactive civic messaging possesses many of the same potential benefits. Various modes of communication about local and national politics via the Internet allow citizens to gain knowledge, share their views, and engage in communicative action. In particular, sharing political perspectives electronically, contacting political elites via the Internet, and organizing community service may contribute directly to engagement. Although the potential effects on participation may seem self-evident, some scholars have expressed concern about the ersatz nature of these interactions. Nonetheless, we adopt

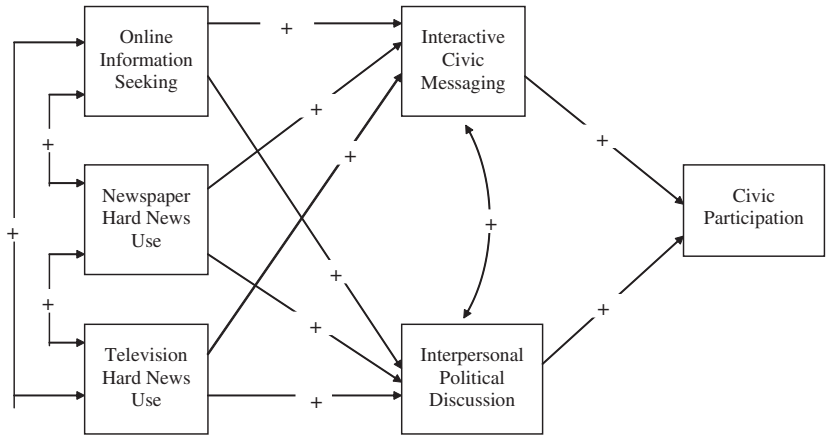

Figure 1. Theorized Model of Communication and Civic Participation

the view that these forms of online interaction about public issues have the capability to encourage participation in a manner that complements the effects of offline political talk.

Integrating extant research with these assertions leads us to advance the following theoretical model (see Figure 1). This model highlights the effects of Internet uses on civic participation while also accounting for a much broader range of citizen communication behaviors. We assert that these online and offline communication behaviors are complementary such that (a) modes of information seeking are positively interrelated with each other, as are modes of citizen communication; (b) traditional forms of news consumption can lead to online civic messaging; and (c) Internet information seeking can foster greater political discussion. We also theorize a causal structure among these variables, leading from information-seeking behaviors to citizen communication, resulting in civic participation. We test the relationships among these variables and the causal structure among them by applying three different modeling approaches and comparing six distinct causal orderings of these constructs.

Method

This study uses data from a national panel survey conducted in February 1999, June 2000, and November 2000. The February 1999 data were collected by Market Facts, a commercial survey research firm, for DDB-Chicago's annual mail survey, the Life Style Study. The Life Style Study relies on a stratified quota–sampling technique to recruit respondents. Initially, the

survey firm acquires contact information for millions of Americans from commercial list brokers, who gather identifying information from drivers license bureaus, telephone directories, and other centralized sources. Large subsets of these people are contacted via mail and asked to indicate whether they are willing to participate in periodic surveys. Small incentives, which range from prepaid phone cards to Post-it notes, depending on the length of the survey, are offered.

Rates of agreement vary widely across demographic categories. For example, 5% to 10% of middle-class recruits typically consent, compared to less than 1% of urban minorities (Putnam & Yonish, 1999). It is from this prerecruited group of roughly 500,000 people that demographically balanced samples are constructed for collection of the annual Life Style Study. To achieve a representative pool of respondents, stratified quota–sampling procedures are employed. That is, the sample is drawn to reflect the properties of the population within each of the nine Census divisions in terms of household income, population density, age, and household size. This starting sample is then adjusted within a range of subcategories that include race, gender, and marital status to compensate for differences in return rates.

This sampling method was used to generate the initial sample of 5,000 respondents for the 1999 Life Style Study. Of the 5,000 mail surveys distributed, 3,388 usable responses were received, which represents a response rate of 67.8% against the mailing. Although this stratified quota–sampling method differs from conventional probability sample procedures, it produces highly comparable data (see Putnam, 2000).[3]

For the June 2000 wave of the study, the first recontact wave (hereafter labeled Wave 1), we developed a custom questionnaire and recontacted the individuals who completed the February 1999 Life Style Study. Because of some panel erosion, 2,737 questionnaires were mailed. A small tote bag was offered as an incentive for completing the survey to ensure a high response rate and a more representative sample. A total of 1,902 respondents completed the questionnaire, for a panel retention rate of 56.1% and a response rate against the mailing of 70.1%.

For the November 2000 wave of the study, the second recontact wave (hereafter labeled Wave 2), another questionnaire was developed. This survey reassessed many variables from Wave 1 and added new sets of questions concerning the 2000 presidential election. The study was fielded immediately after Election Day, November 7, 2000. Once again, individuals who completed the prior survey were recontacted. Because of some erosion in the panel, 1,850 questionnaires were mailed to June 2000 respondents. With 1,315 completed responses, the panel retention rate was 69.1%, and the response rate against the mailing was 71.1%.[4]

Table 1
Descriptive Statistics of Key Variables

Variable	*M*	*SD*	*n*	Min	Max
Wave 1 data					
Civic participation	2.01	1.12	1,468	1.00	7.40
Online information seeking	2.20	1.35	1,472	1.00	7.50
Newspaper use	0.00	0.87	1,461	–1.10	2.23
Television news use	0.00	0.83	1,462	–1.39	2.22
Civic messaging	1.15	0.45	1,452	1.00	7.25
Political talk	2.60	1.42	1,470	1.00	8.00
Wave 2 data					
Civic participation	2.12	1.32	973	1.00	8.00
Online information seeking	2.34	1.52	971	1.00	8.00
Newspaper use	0.00	0.89	978	–1.27	1.59
Television news use	0.00	0.83	978	–1.44	1.53
Civic messaging	1.24	0.67	965	1.00	8.00
Political talk	3.60	1.64	976	1.00	8.00
Wave 2 - 1 change score					
Civic participation	0.09	0.89	968	–2.80	6.80
Online information seeking	0.16	1.05	970	–4.50	5.25
Newspaper use	–0.04	0.75	970	–2.52	2.69
Television news use	–0.04	0.79	971	–2.82	2.66
Civic messaging	0.09	0.57	950	–5.50	5.50
Political talk	0.99	1.37	974	–4.40	7.00

Note: All indices were created by averaging raw scores of measured items except newspaper use and television news use. Measures of exposure and attention to newspaper and television news were standardized prior to being averaged because they were measured on a different scale. Accordingly, the numbers for newspaper use and television news use are less interpretable.

Measures

The analyses reported here were confined to those who are Internet users (N = 1,474 for Wave 1; N = 984 for Wave 2) to avoid inflated correlations. Our analyses included six variables: newspaper hard news use, television hard news use, online information seeking, interpersonal political discussion, interactive civic messaging, and civic participation, with participation functioning as a criterion variable in all models. Descriptive statistics of these variables are summarized in Table 1.

Civic participation was measured by asking respondents how often they had engaged in the following activities: did volunteer work, went to a club meeting, worked on a community project, went to a community or neighborhood meeting, and worked on behalf of a social group or cause. Responses were recorded on an 8-point scale (see the Appendix for question wording).

An index was created by averaging scores across measures (Cronbach's α = .78 for Wave 1; Cronbach's α = .82 for Wave 2).

Both newspaper hard news and television hard news use indices were created using measures of exposure and attention to hard news content. For exposure to hard news, two questions were used to measure how many days in the past week respondents read articles (for newspapers) or watched stories (for television news) about national government and politics or local government and politics. Responses were recorded on an 8-point scale. For attention to hard news, respondents were asked to report how much attention they paid to articles (for newspapers) or stories (for television news) about national government and politics or local government and politics. Responses were recorded on a 10-point scale that raged from *very little attention* to *very close attention*. To create a single index of newspaper use, measures of exposure and attention were standardized and averaged (Cronbach's α = .89 for Wave 1; Cronbach's α = .91 for Wave 2). An index for television news use was created in the same way (Cronbach's α = .85 for Wave 1; Cronbach's α = .86 for Wave 2).

The measure of online information seeking consisted of five questions asking how often respondents visited a news Web site, received news or sports information via the Internet, visited the Web site of a government agency, visited the Web site of a politician, or visited the Web site of a social group or cause. An 8-point scale was used for each item. An index was constructed by averaging scores from these items (Cronbach's α = .74 for Wave 1; Cronbach's α = .78 for Wave 2).

The measure of interpersonal political discussion consisted of five questions gauging how often respondents talked about politics with coworkers, talked about politics with neighbors, talked about politics with friends, talked about politics with family, or talked about politics with acquaintances. Again, an 8-point scale was used. An index was constructed by averaging the scores from these items (Cronbach's α = .89 for Wave 1; Cronbach's α = .85 for Wave 2).

Interactive civic messaging was comprised of seven items assessing how often respondents discussed politics via e-mail with someone, contacted a politician because of an e-mail they received, sent an e-mail to the editor of a newspaper or magazine, sent an e-mail to a politician, tried to recruit someone to volunteer with e-mail, used e-mail to organize a social activity, or used e-mail to organize community service. Responses were recorded on an 8-point scale. An index was created by averaging across these measures (Cronbach's α = .75 for Wave 1; Cronbach's α = .80 for Wave 2).

Analysis

To examine the simultaneous effects of online and offline media use and citizen communication on civic participation, we employed three different analytic strategies using LISREL. That is, three different modeling approaches were used to fit the data: (a) a cross-sectional model that relates individual differences in these indicators based solely on wave 1 data, (b) a fixed-effects model that relates intraindividual change scores between Wave 1 and Wave 2, and (c) an auto-regressive model that relates aggregate change estimates generated by lagging Wave 1 variables on their Wave 2 counterparts. Each approach has unique advantages and disadvantages that are counterbalanced by the other models, as we discuss in detail below (Finkel, 1995). The cross-sectional model set out to examine contemporaneous relations at the first wave of data collection. Although this analytic strategy does not take advantage of the panel design, we include it here for three reasons. First, it retains a larger and more representative sample. Second, it serves as a baseline against which we compare the fixed-effects and auto-regressive models. And last, it allows us to connect this research to previous scholarship that has mainly relied on cross-sectional analyses to examine the structure of these relationships. Before fitting the model to the data, a residualized covariance matrix was created by regressing all measures on a set of variables that included age, education, income, gender, and race. By using the residualized covariance matrix as input in the model, we control for these variables.

For the fixed-effects model, we used the raw difference score, calculated by subtracting the Wave 1 score from the Wave 2 score, for all variables in the model. The main benefit of using the fixed-effects model is to obtain unbiased estimates not contaminated with confounding effects of any enduring unmeasured traits of individuals (Allison, 1990; Liker, Augustyniak, & Duncan, 1985). It is not hard to think of such characteristics that could have effects on the outcome variables in this study. They include personalities and predispositions formed in the process of socialization, established intelligence, cohort features, interpersonal and social milieu, and so forth. All these unmeasured variables are not likely to change during the time window between waves of data collection in this study. By estimating parameters with change scores, this model removes the unique effects of stable and unmeasured individual characteristics, called fixed effects, on civic participation. Thus, we can interpret estimates from this type of difference model as those above and beyond any fixed effects. Accordingly, demographic variables were not controlled statistically in this model because each individual serves as a control for himself or herself.

Last, we turn to the auto-regressive model in which each Wave 2 measure is regressed on its corresponding Wave 1 measure, with demographic characteristics residualized. A longstanding debate in the field of statistics concerns the appropriateness of fixed-effects models given their potential to inflate error variances because of the estimation of change at the individual level (Arminger, 1987; see also Cohen & Cohen, 1983). The auto-regressive model is basically a type of the difference model that relies on change scores estimated at the aggregate level. The paths between Wave 1 and Wave 2 measures represent temporal stability and effectively control for prior levels of the variable, making other paths interpretable as relating change among these auto-regressed outcomes in a synchronous model. This approach aims to explain the unexplained variance among endogenous Wave 2 variables while accounting for stability in these variables over time. Estimates of change are derived across the sample rather than within each individual. As a result, error variances are generally reduced, producing more stable, albeit potentially less sensitive, estimates of gains or losses. To determine the best fit between the data and each approach, we compare the relative performance of tested models across several measures: (a) the Akaiki Information Criterion (AIC), (b) the Consistent AIC (CAIC), (c) the root mean squared error of approximation (RMSEA) and, (d) the ratio of the chi-squared statistic to the degrees of freedom for the model (χ^2/df). The AIC and CAIC are both used because they impose differential penalties on models that include more structural paths and therefore are less parsimonious, with AIC most generous and CAIC the most conservative with regard to model complexity. Yet model comparisons using AIC and CAIC are sensitive to sample size. Thus, we also used RMSEA and χ^2/df as measures of relative fit, with lower values taken as a sign of better model performance (see Eveland, Hayes, Shah, & Kwak, in press).[5] The principle of parsimony leads us to prefer less complex models to more complex models given equivalent fit across the variety of measures used to assess the performance of each model.

As discussed earlier, modeling change—either at the individual or aggregate level—with panel data has an advantage over the cross-sectional model, which simply relates individual differences, when attempting to understand the causal flow among variables. Despite this advantage, both the fixed-effects and auto-regressive models that assess relationships among synchronously measured variables (i.e., that relate change in Time 2 variables relative to Time 1 with one another) do not resolve the issue of causality. Thus, we also test five alternate causal orderings of the three sets of variables contained in our models: information seeking, citizen communication, and civic participation. By comparing the model fit and parsimony of these alternate

Table 2
Model Summary

	AIC	CAIC	RMSEA	χ^2/df	R^2 (%)
Wave 1 cross-sectional model					
Model 1: Saturated[a]	42.00	168.18	—	—	11
Model 2: Trimmed[b]	38.64	152.80	.000	0.64/2	11
Model 3: Final[c]	36.77	144.92	.000	0.77/3	11
Wave 2 – wave 1 fixed effects model					
Model 1: Saturated[a]	42.00	160.57	—	—	9
Model 2: Trimmed[b]	40.53	142.17	.030	4.53/3	9
Model 3: Final[c]	38.58	134.57	.010	4.58/4	9
Wave 2 auto-regressive model					
Model 1: Saturated[a]	328.80	526.44	.048	268.80/48	56
Model 2: Trimmed[b]	305.91	483.78	.045	251.91/51	56
Model 3: Final[c]	303.04	467.78	.044	253.09/53	56

Note: AIC is the Akaiki information criterion. CAIC is the consistent AIC. RMSEA is the root mean squared error of approximation (RMSEA).
a. This is the fully saturated model with all structural path freed to be estimated.
b. This is the trimmed model with nonsignificant direct information effects on participation removed.
c. This is the final model with all nonsignificant paths removed.

causal orders, which are also tested using cross-sectional, fixed-effects, and auto-regressive approaches, to the performance of our theorized model, we are able to examine whether the causal structure we advance most closely fits the relationships observed in these data. This model comparison approach permits tests of the robustness of our theoretical arguments under different analytic conditions.[6]

Results

Model Specification and Modification

To identify the best fitting cross-sectional, fixed-effects, and auto-regressive models, we started by fitting a saturated model with all structural paths freed up to be estimated. That is, all information media use variables (i.e., online information seeking, newspaper use, and television news use) are set to have a direct influence on online and offline political communication and civic participation.[7] Then, we trimmed each model by removing nonsignificant paths from informational media use to civic participation to more closely examine any significant indirect influences on civic participation through either online or offline citizen communication. Ultimately, we present a final model for each approach in which all nonsignificant paths are removed. As indicated in Table 2, these models fit the data best and explain the same

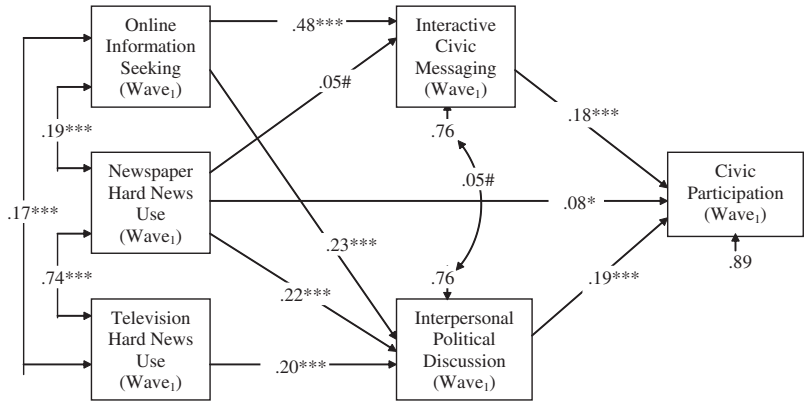

Figure 2. Cross-Sectional Model of Communication and Civic Participation (Wave 1)
Note: Standardized path coefficients are reported.
#$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

amount of variance in the criterion variable, civic participation, as the saturated and trimmed models while providing the most parsimonious solutions. Given the performance of these trimmed models on a number of criteria, including their empirical fit across measures and their relative parsimony compared to other specifications, we accept them as our final models. Results from these final models will be discussed in the following section.[8]

The Cross-Sectional Model

Figure 2 presents the LISREL estimates of the structural relationships among informational use of media, interactive civic messaging and interpersonal political discussion, and civic engagement. Overall, this model fits the data very well, yielding chi-square value of 0.77 with 3 degrees of freedom (RMSEA = .00, NFI = 1.00, NNFI = 1.00, SRMR = .004).[9]

The relationships observed here support the view that informational use of media contributes to citizen political expression, online and offline, which in turn encourages civic engagement. Specifically, individual differences in newspaper and television hard news use are positively associated with interpersonal political discussion ($\gamma = .22, p < .001$ for newspaper use; $\gamma = .20, p < .001$ for television news use). Similarly, data show that cross-sectional variation in online information seeking is a strong positive predictor of interpersonal political discussion ($\gamma = .23, p < .001$). Our results are consistent with prior research that finds a connection between levels of information seeking and interpersonal discussion.

More important, both newspaper use ($\gamma = .05, p < .10$) and online information seeking ($\gamma = .48, p < .001$) are positively associated with interactive civic messaging in the cross-sectional model, although the relationship between newspaper reading and interactive civic messaging falls short of achieving significance. Television news use fails to account for variance in citizen communication about politics via the Internet. Collectively, individual differences in online information seeking and traditional media use account for 24% of the variance in interactive civic messaging and interpersonal political discussion, respectively.

Further, both interpersonal political discussion ($\beta = .19, p < .001$) and interactive civic messaging ($\beta = .18, p < .001$) yield significant positive associations with civic participation. That is, respondents who frequently engaged in communicative action through either interpersonal or computer-mediated channels are more likely to exhibit high levels of civic engagement. The two communicative action variables accounted for 11% of the variance in civic engagement.

As noted earlier, we decompose the information influence on civic participation by estimating direct and indirect paths from online information seeking and news media use to civic participation. We find that newspaper use, television news use, and online information seeking have indirect effects on cross-sectional variation in participation. Newspaper use ($.05, p < .01$) and online information seeking ($.13, p < .001$) operate through political discussion and civic messaging, whereas television news use only works through political discussion ($.04, p < .01$).

Worth noting is that only newspaper use is found to have a direct effect on civic participation ($\gamma = .08, p < .05$) when all other paths are considered simultaneously. Overall, this cross-sectional data analysis provides evidence indicating that the direct effects of informational media use are on online and offline citizen communication, which in turn influence levels of civic participation. The model also provides evidence that newspaper and television news use are strongly interrelated ($\Phi = .74, p < .001$), with both much more weakly linked to online information seeking ($\Phi = .19, p < .001$; $\Phi = .17, p < .001$, respectively) in the Wave 1 data. Also, the association between interactive civic messaging and interpersonal political discussion was nonsignificant, with a psi coefficient of .05 ($p < .10$).

The Fixed-Effects Model

Figure 3 presents the results of the fixed-effects model using raw change scores between Wave 2 and Wave 1 for parameter estimation. This model yields a good fit to the data, almost equivalent to the cross-sectional model,

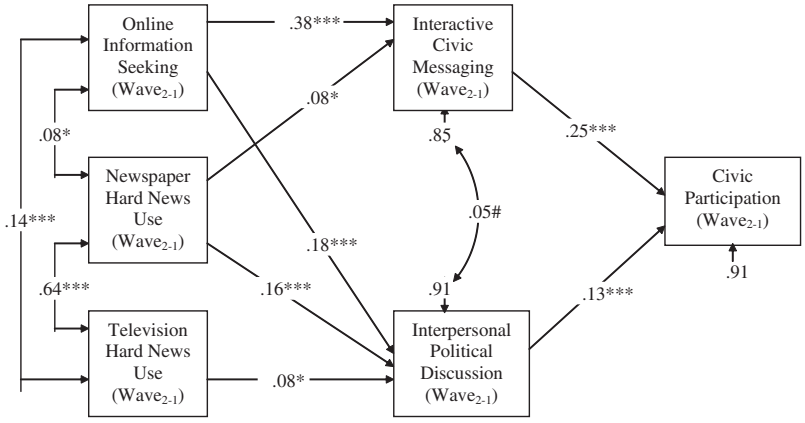

Figure 3. Fixed-Effects Model of Communication and Civic Participation (Wave 2 - Wave 1)

Note: Standardized path coefficients are reported.
#$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

with estimated chi-square value of 4.58 and 4 degrees of freedom, for a ratio that is well below 3. Other goodness-of-fit indices show the adequacy of the model (RMSEA = .01, NFI = .99, NNFI = .99, SRMR = .01).

As shown in Figure 3, the results of the fixed-effects model largely parallel those of the cross-sectional model, though the relationships being examined are now among intraindividual change in these variables between Wave 1 and Wave 2. Changes in the level of newspaper hard news use ($\gamma = .16, p < .001$), television hard news use ($\gamma = .08, p < .05$), and online information seeking ($\gamma = .18, p < .001$) are positively associated with a corresponding change in interpersonal political discussion. The results from the fixed-effects model also indicate that intraindividual changes in both online information seeking ($\gamma = .38, p < .001$) and newspaper use ($\gamma = .08, p < .05$) have a positive relationship with intraindividual change in interactive civic messaging.

Similar to the cross-sectional model, the path from television hard news use to interactive civic messaging failed to reach statistical significance. Although the strength of relationships is somewhat weaker in comparison to the cross-sectional model, the pattern of relationships between individual change in information seeking and individual change in political discussion and civic messaging lends support to our theoretical model using a much more conservative test of effects. Not surprisingly, the fixed-effects model accounts for less variance in political discussion and civic messaging compared to the cross-sectional model; changes in patterns of informational

media use accounted for 9% and 15% of variance in corresponding shifts in political discussion and civic messaging, respectively.

The fixed-effects model also generates a pattern of relationships among endogenous variables that largely reinforces the findings from the cross-sectional model. Intraindividual changes in interpersonal political discussion ($\beta = .13, p < .001$) and interactive civic messaging ($\beta = .25, p < .001$) are positively associated with changes in civic participation. That is, people who engaged more frequently in political talk and civic messaging between waves are more likely to participate in civic life at increasingly higher rates during this period. This model accounted for a total of 9% of variance in civic participation.

However, patterns in direct and indirect effects of changes in informational use of media on changes in civic participation do not parallel the results observed in the cross-sectional model. In the fixed-effects model, no significant direct path was detected, indicating that changes in individuals' levels of information seeking had little effect on personal shifts in civic participation. Instead, the effects of intraindividual change in news consumption appear to be focused on online and offline citizen communication. Hence, total effects of informational use of media are equal to indirect effects. Accordingly, online information seeking ($.10, p < .001$) and newspaper use ($.05, p < .01$) have significant indirect effects on civic participation.

Phi coefficients among the information-seeking variables indicate that individual changes in television news use and newspaper consumption are strongly associated with one another ($\Phi = .64, p < .001$) and only moderately associated with corresponding changes in online information seeking ($\Phi = .14, p < .001$; $\Phi = .08, p < .05$, respectively). Likewise, individual shifts in interactive civic messaging is unassociated with interpersonal political discussion ($\Psi = .05, p < .10$), further suggesting the distinctiveness of these behaviors. Not only are these two forms of citizen expression unrelated in cross-sectional analyses, intraindividual changes among these conceptually similar sets of behaviors are not significantly interlinked.

The Auto-Regressive Model

Figure 4 presents the results of the LISREL estimates of the synchronous auto-regressive model of the relationships among Wave 2 measures of informational use of media, citizen communication, and civic participation when accounting for the causal influence of each variable on itself over time.[10] In terms of the global fit of the model, chi-square statistic and other indices of model fit suggest that this model accounts for the observed data fairly well ($\chi^2/df = 4.77$, RMSEA = .44, NFI = .98, NNFI = .98, SRMR = .04).

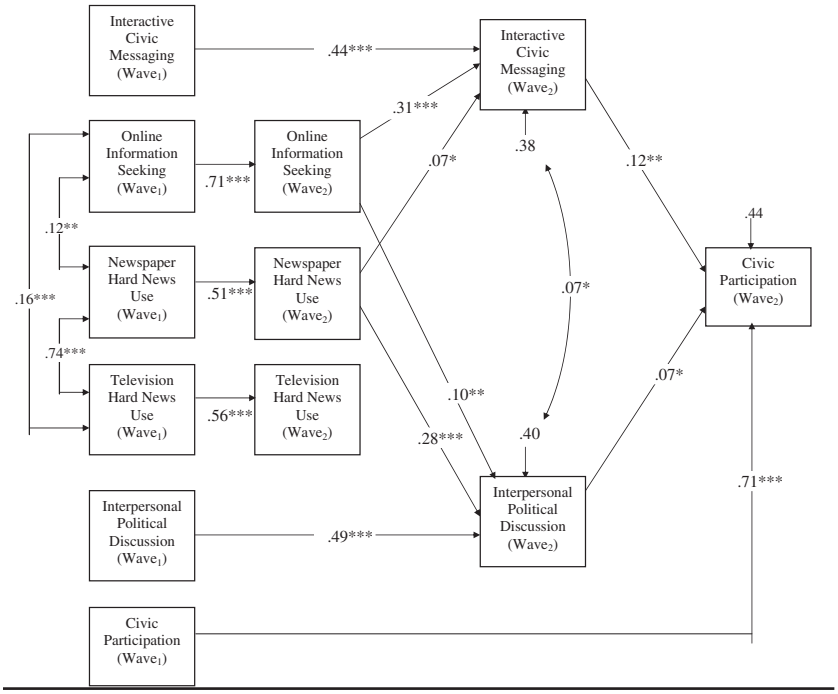

Figure 4. Auto-Regressive Model of Communication and Civic Participation
Note: Standardized path coefficients are reported.
*$p < .05$. **$p < .01$. ***$p < .001$.

As noted earlier, an autoregressive term of each variable was put in as a control and specified as an exogenous variable. Thus, in each structural regression equation, the gamma coefficients (γ) represent the stability of the variable over time, and beta coefficients (β) reflect the influence of predictor variables on the outcome variable above and beyond the causal influence of prior levels of the outcome variable on itself. As reported in Figure 4, the gamma coefficients range from .44 to .71, indicating that past behavior in terms of media use, communication, and civic participation is a strong predictor of current behavior. Stability was highest for online information seeking and civic participation and lowest for citizen expression.

As for the endogenous relationships, results of this model are comparable to those of the previous two synchronous models: the cross-sectional and fixed-effects models. Wave 2 newspaper use ($\beta = .28$, $p < .001$) and online information seeking ($\beta = .10$, $p < .01$) are significant predictors of Wave 2 political discussion, even after accounting for prior levels of these variables (newspaper use, $\gamma = .51$, $p < .001$; online information seeking, $\gamma = .71$, $p < .001$; political discussion, $\gamma = .49$, $p < .001$). Likewise, these estimates of change in newspaper use ($\beta = .07$, $p < .05$) and online information seeking ($\beta = .31$, $p <$

.001) are positively associated with interactive civic messaging, even when accounting for the lagged effect of civic messaging ($\gamma = .44$, $p < .001$). This model accounted for a total of 60% of variance in interpersonal discussion and 62% in interactive civic messaging. Finally, unexplained variance in Wave 2 measures of online ($\beta = .12, p < .01$) and offline ($\beta = .07, p < .05$) citizen communication have a positive influence on Wave 2 civic participation, even when accounting for the strong effect of past civic participation ($\gamma = .71, p < .001$) on itself. This model accounts for 56% of variance in civic participation.

Notably, no significant direct effect of informational media use on civic participation was found in this synchronous auto-regressive model. Only online information seeking ($.04, p < .01$) and newspaper use ($.03, p < .01$) have an indirect influence on change estimates in civic participation through sample shifts in either online or offline citizen communication. As observed in the prior models, the exogenous variables are significantly intercorrelated. A strong relationship was observed between the traditional media use variables ($\Phi = .74, p < .001$), with weaker but positive relationships between traditional news use and online information seeking ($\Phi = .12, p < .01$ for newspapers; $\Phi = .16, p < .001$ for television news). Somewhat similar with previous findings, the relationship between the endogenous online and offline citizen communication variables is weak, though in this case it is statistically significant ($\Psi = .07, p < .05$).

Additional Analysis

To further examine the performance of our theoretical model of citizen communication mediation relative to alternative causal orderings of the key variable clusters, we ran an additional 30 tests that specified different structural arrangements of the variable clusters of information seeking, citizen communication, and civic participation. That is, for each of our three analytic strategies—cross sectional, fixed effects, and auto regressive—we ran five fully saturated models of alternate mediated effects and then reran these models trimming any nonsignificant paths (10 runs for each of the three analytic strategies).[11]

As seen in Table 3, which reports the final trimmed models for each alternative specification, every other conceivable causal ordering of our variable clusters (Models 2-6) produced less well-fitting models than our theoretical model (Model 1). When civic participation served as the mediator between information seeking and citizen communication, model fit was extremely poor across all three analytic strategies (models 2 and 4). Similarly, when information-seeking variables served as mediators between civic participation and citizen communication, model fit was still not acceptable for either

the cross-sectional or fixed-effects models as indicated by the high chi-square to degrees of freedom ratio and RMSEA (Models 3 and 5). For the auto-regressive model, the high chi-square values and the elevated fit indices (AIC and CAIC) lead us to prefer our theorized model. The only specification that approaches the goodness of fit observed in our theorized model is its inverse specification (Model 6), with civic participation encouraging citizen communication, which in turn spurs information seeking. It is not surprising that this model performs well given that this specification is essentially equivalent to our theorized structure in terms of the pattern of the covariance among these variables (Bollen, 1989). However, we view this inverse causal ordering as considerably less plausible than our theoretical model, though we must nonetheless consider it as a possibility, given prior theorizing and empirical evidence (Lupia & Sin, 2003; McLeod et al., 2001). Indeed, there is a long line of theoretical and empirical work examining the relationship between political information and civic engagement that speaks to the superiority of Model 1 over Model 6 (Delli Carpini & Keeter, 1996; Verba, Schlozman, & Brady, 1995; Zaller, 1992). We return to this issue in our interpretation of these findings.

Discussion

Our analysis of this national panel study provides a range of important insights about information and expression in a digital age. We find considerable support for our theoretical model, with informational media use encouraging citizen communication, which in turn spurs civic engagement. What is most intriguing in these findings is the role played by the Internet. Online information seeking and interactive civic messaging—uses of the Web as a resource and a forum—both strongly influence civic engagement, often more so than do traditional print and broadcast media and face-to-face communication. These effects are largely replicated across three well-fitted synchronous models, cross sectional, fixed effects, and auto regressive, providing considerable confidence in these findings. That is, we found largely consistent patterns of relationships among these variables regardless of whether we were examining associations among individual differences, intraindividual change, or net gains.

By employing an analytic strategy that examined change in these variables over time (i.e., the fixed-effects models and the auto-regressive models), our results reveal that these variables are not only related at a single time point but that changes over time in patterns of information gathering, political expression, and civic participation are interconnected. The concurrent relationships observed in the cross-sectional model were largely replicated

Table 3
Model Comparison

	AIC	CAIC	RMSEA	χ^2/df
Final mediation model[a]		Cross sectional-model		
1. Information seeking → citizen communication → civic participation	42.96	139.09	.033	10.96/5
2. Information seeking → civic participation → citizen communication	550.15	636.60	.238	522.15/7
3. Citizen communication → information seeking → civic participation	119.49	224.46	.125	85.49/4
4. Citizen communication → civic participation → information seeking	551.34	643.96	.257	521.34/6
5. Civic participation → information seeking → citizen communication	120.56	225.53	.126	86.56/4
6. Civic participation → citizen communication → information seeking	44.63	143.42	.034	12.63/5
		Fixed-effects model		
1. Information seeking → citizen communication → civic participation	38.58	134.57	.014	4.58/4
2. Information seeking → civic participation → citizen communication	182.07	255.41	.155	156.07/8
3. Citizen communication → information seeking → civic participation	86.86	182.85	.126	52.86/4
4. Citizen communication → civic participation → information seeking	182.05	255.45	.155	156.05/8
5. Civic participation → information seeking → citizen communication	86.20	170.90	.104	56.20/6
6. Civic participation → citizen communication → information seeking	40.53	142.17	.026	4.53/3
		Auto-regressive model		
1. Information seeking → citizen communication → civic participation	303.04	467.78	.044	253.09/53
2. Information seeking → civic participation→ citizen communication	701.75	853.27	.075	655.75/55
3. Citizen communication → information seeking → civic participation	357.15	521.85	.049	307.15/53
4. Citizen communication → civic participation → information seeking	708.81	866.91	.076	660.81/54
5. Civic participation → information seeking → citizen communication	344.62	515.90	.049	292.62/52
6. Civic participation → citizen communication → information seeking	317.83	489.16	.040	267.83/53

Note: AIC is the Akaiki information criterion. CAIC is the consistent AIC. RMSEA is the root mean squared error of approximation (RMSEA).
a. This is the final trimmed model with all nonsignificant paths from fully saturated mediated model removed.

when we took advantage of the panel components of our design. When modeling change, whether testing a fixed-effects model that is unbiased by the confounding effects of any enduring unmeasured traits of individuals or a auto-regressive model where stability of each variable is considered when estimating change scores, the structural equation models revealed a set of relationships that largely confirm our theory. That the results are essentially equivalent across these two approaches to modeling panel data—each with its own strengths and weaknesses—provides considerable support for our theoretical model.

We are further assured about the structure of the relationships within our causal model by our test of alternate orderings of our key variable clusters. Our theoretical model of citizen communication mediation between information seeking and civic participation was found to be the best fitting model in comparison to most possible alternate specifications of mediated effects. Thus, it appears that citizen communication, both online and offline, plays a critical role in the relationship between information seeking via mass media and participation in civic life. The one exception was the reverse causal ordering, beginning with civic participation and ending with informational media use. Although we cannot exclude the possibility that civic participation drives citizen communication, which in turn fosters information seeking, this seems considerably less plausible than our theoretical model, which begins with information seeking. The treatment of information seeking as antecedent to these other variables is consistent with a large body of theoretical and empirical work on the mobilizing potential of media advanced in political science, sociology, and communication (Almond & Verba, 1963; Coleman, 1990; Delli Carpini & Keeter, 1996; Habermas, 1979; McLeod et al., 1996, 1999; Putnam, 2000; Tönnies, 1940; Verba et al., 1995; Zaller, 1992).

All in all, the observed relationships speak to the centrality of citizen communication resulting from informational media use and leading to civic participation. They also reveal that both online and offline channels culminate in actual participation. Indeed, newspaper reading and online information seeking have effects on both political talk and civic messaging, which in turn each individually encourage civic engagement. Thus, our findings refute the perspectives (a) that there are two discrete communication pathways to civic engagement, one online (online information seeking to interactive civic messaging) and the other offline (newspaper use to political talk) and (b) that political uses of the Internet sap civic actions by fostering an ersatz experience of engagement leading to a dead end. The crosscutting nature of the effects between informational media use and citizen expression, as well as their size and robustness, across two different models of change adds to the

contribution of this study in clarifying the role of the Internet in the contemporary American political landscape.

The implications of these findings are twofold. First, even if certain forms of Internet use diminish sociability and community engagement (a claim that we regard with cautious skepticism), the civic potential of interactive civic messaging may work to counter these effects. Although this analysis cannot vindicate the Internet as a cause of social withdrawal, it certainly suggests that when two of the most popular uses of the Internet—browsing and e-mailing—are used to gain information and express opinions about public affairs, they have substantial potential to affect the health of civil society. Second, the observed effects of interactive civic messaging on participation speak to the potential of the Internet to enable collective action without the temporal, geographic, and size limitations of face-to-face communication. The Internet, by permitting the exchange of views across "long distances, or to many people, can reduce organizational costs, increase noticeability and make ineffective communication networks effective" (Lupia & Sin, 2003, p. 329). It also may be the homogeneous nature of e-mail contacts that produces the effect of civic messaging on participation. In much the same manner that talk radio, with its primarily right-wing orientation, encourages participation among conservatives but not liberals (Hollander, 1997) and homogeneous but not heterogeneous discussion networks facilitate participation (Mutz, 2002b), the electronic exchange of political views free of cross pressures may help explain the mechanisms underlying the effect on civic engagement.

This is most promising in relation to the so-called Gen.com (Delli Carpini, 2000; see also Shah, Kwak, et al., 2001; Shah, McLeod, et al., 2001), young Americans who are wired into the virtual world but disengaged from public life, at least as measured by longstanding indicators. If civic messaging has the potential to encourage new modes of expression, deliberation, and recruitment among young people who are unconstrained by the inherent limitations of traditional face-to-face forms of citizen communication, the civic consequences would be considerable. Although this research did not consider the role of instant messaging, electronic bulletin boards, chat rooms, and Weblogs, each of these modes of online citizen communication deserves research attention.

It is also clear from this analysis that attention to patterns of media use clarifies the influence of mass communication on civic engagement. Indeed, when properly specified, the effects of the Internet apparently rival the effects of newspaper hard news use on expression and action. Somewhat similarly, television hard news, running counter to wholesale claims about the demobilizing effects of the entire medium, has some positive, indirect effects

on civic participation. Future research should emphasize the intricacies of how people use these media over crude assessments of how much they use them when drawing conclusions about civic life.

Still, this research has some limitations. Our treatment of online and offline citizen communication as a conduit between the information people receive and the actions they take may oversimplify a much more complex process that involves issue reflection, cognitive complexity, and citizen efficacy. Future research should consider these other potential mediators highlighted in McLeod's (McLeod et al., 2001; Sotirovic & McLeod, 2001) communication mediation model, recognizing that our model illustrates only part of the whole story concerning media and civic engagement. Another potential weakness may be found in the fact that we focused our attention on the testing of synchronous structural models rather than lagged models of information and communication effects. Although this approach was borne out by our data and is consistent with recent research on political knowledge gain (see Eveland et al., in press), future research should continue to examine both lagged and synchronous models when examining these relationships. Ideally, future work will make use of multiwave panel data, allowing for a full specification of lagged models involving three sets of variables—information, communication, and participation.

Notably, these data were collected during the course of the 2000 presidential campaign, an intense political communication event. The election context likely intensified our model of communication effects on civic engagement. Although we purposely chose to test our models within this context to maximize the potential for change in the panel collections, the question of whether these relationships exist outside of an election context, especially one that was as idiosyncratic as the race between George Bush and Al Gore, remains unanswered. Researchers interested in the role of the Internet in public life should attempt to replicate these findings outside of an election context to establish the generalizability of these results.

Nonetheless, the consistent pattern of indirect effects of mass media variables on civic engagement through interpersonal political discussion and interactive civic messaging provides considerable support for our model. As this model suggests, the effects of informational uses of mass media are strong but largely focused on online and offline citizen communication. These findings add considerably to our understanding of the role of the Internet, focusing attention on interpersonal variables and specifying how this emerging medium serves as both a source of information and a sphere of communicative action. They also add to our growing understanding of the causal flow among information seeking, citizen communication, and civic engagement. Future research must continue to move beyond structural modeling of cross-

sectional data to analytic strategies employing panel data—fixed-effects models or auto-regressive models—and explore the possibility of alternate causal orderings among these variables. In this way, we can refine our understanding of media effects, especially Internet effects, on contemporary civic and political life in advanced democratic societies.

Appendix
Question Wording

Please indicate how often during the past 12 months [the past 3 months, for Wave 2] you have engaged in this activity by selecting a number from 1 to 8.

	Wave 1	Wave 2
1	None in the past year	None in the past 3 months
2	1-4 times	1 time
3	5-8 times	2 times
4	9-11 times	3 times

Civic participation:

Went to a club meeting.
Did volunteer work.
Worked on a community project.
Went to a community or neighborhood meeting.
Worked on behalf of a social group or cause.

Online information seeking:

Visited a news Web site (e.g., CNN.com).
Received news or sports information via the Internet.
Visited the Web site of a government agency.
Visited the Web site of a social group or cause.
Visited the Web site of a politician.

Interpersonal political discussion:

Talked about politics with coworkers.
Talked about politics with neighbors.
Talked about politics with friends.
Talked about politics with family.
Talked about politics with acquaintances.

Interactive civic messaging:

Discussed politics over e-mail with someone.
Contacted a politician because of an e-mail you received.

E-mailed the editor of a newspaper or magazine.
E-mailed a politician.
Tried to recruit someone to volunteer with e-mail.
Used e-mail to organize a social activity.
Used e-mail to organize community service.

Newspaper and television hard news exposure:

Please indicate how many days in the past week you used the media in the manner described by selecting a number from 0 to 7.

[0 indicates *never*, and 7 indicates *7 days*.]
Read articles about national government and politics in newspapers.
Read articles about local government and politics in newspapers.
Watched stories about national government and politics on television.
Watched stories about local government and politics on television.

Newspaper and television hard news attention:

When you come across the following kinds of coverage in the news, how much attention do you pay to them?

[1 means *very little attention*, and 10 means *very close attention*.]
Articles about national government and politics in newspapers.
Articles about local government and politics in newspapers.
Stories about national government and politics on television.
Stories about local government and politics on television.

Notes

1. Support for the research reported in this manuscript was provided through a major grant from the Ford Foundation through the Digital Media Forum to D. Shah. Additional support was provided by the following sources (organized alphabetically): Department of Communication, University of California, Santa Barbara to W. Eveland; Howard R. Marsh Center for the Study of Journalistic Performance, Department of Communication Studies, University of Michigan to N. Kwak; Journal Communications/ Warren J. Heyse Faculty Excellence Award, University of Wisconsin–Madison to D. Shah; School of Journalism & Communication, Ohio State University, to W. Eveland; School of Journalism & Mass Communication, University of Wisconsin–Madison, Cramer-Krassalt Fund to D. Shah; Special Grants Program, College of Social & Behavioral Sciences, Ohio State University, to W. Eveland; Social Science Research Grant, Institute for Social, Behavioral and Economic Research, University of California, Santa Barbara, to W. Eveland. In addition, the authors would like to thank DDB-Chicago for access to the Life Style Study and Marty Horn and Chris Callahan, in particular, for making these data available and sharing methodological details. Findings and conclusions in this manuscript are those of the authors and do not necessarily reflect the views of the supporting sources or of DDB-Chicago. Correspondence concerning this article should be addressed to Dhavan V. Shah, 5162 Vilas Hall, 821 University Ave., Madison, WI 53706; phone: (608) 262-0388; e-mail: dshah@wisc.edu.

2. The communication mediation model should not be confused with the cognitive mediation model advanced by Eveland (2001; see also Beaudoin & Thorson, 2004; Eveland, Shah, & Kwak, 2003).

3. Putnam, who used 1975 to 1998 Life Style Studies as the primary data for his book *Bowling Alone*, took great care to validate these data against the General Social Survey and Roper Poll (Putnam, 2000; Putnam & Yonish, 1999). This validation involved longitudinal and cross-sectional comparisons of parallel questions found in the Life Style Studies and conventional samples. He concludes that there are "surprisingly few differences between the two approaches" with the mail panel approach producing data that is "consistent with other modes of measurement" (Putnam, 2000, pp. 422-424; see also Groeneman, 1994).

4. We compared patterns of panel attrition of our nonprobability sample with a more conventional probability study, the American National Election Study (ANES). The ANES conducted a first wave of interviews in the months prior to the 2000 election and a follow-up wave immediately after the election. Comparing the November wave of the ANES to our June data collection (technically, the second wave of our study), we find few if any demographic differences. Our respondents were slightly more likely to be female (60.7% in our June wave; 56.7% in the second wave of the ANES). The average age of the two samples was comparable, with the median of our sample being 45 to 54 and the mean of the ANES being 47.89. The level of household income of the two samples was also similar, with our June wave having a median of $40,000 to $44,999 and the ANES having a median of $35,000 to $49,999. Finally, education was similar across the two studies, with our study obtaining a median of 1 to 3 years of college and the ANES more than 12 years of education (but less than a college degree). Thus, it appears that our study experienced similar panel attrition issues as did the ANES.

5. Chi-square goodness-of-fit test is a summary measure describing the amount of deviation of the recreated covariance matrix by the theorized model from the observed matrix. Thus, statistically significant values of chi-square imply the inadequacy of the proposed model. However, because of the fact that chi-square is sensitive to sample size, other things being equal, larger samples are more likely to yield larger values of chi-square and, accordingly, model rejection. To address this issue, the ratio of chi-square to degrees of freedom is often used to assess how well the model fits the data, with a ratio of 3 or less indicating a good fit (Bollen, 1989; Kline, 1998). Standardized root mean squared residual (SRMR) is another useful measure for model fit, indicating standardized covariance residuals. The SRMR value of 0 means a perfect fit: That is, the covariance matrix implied by theorized model is identical to the observed one. An acceptable value of SRMR is less than .1.

6. Another possible response to the problem of determining the causal flow among variables is to test for the lagged effects of selected individual differences at Wave 1 on the estimated aggregate change in the outcome variable between Wave 1 and Wave 2 using an auto-regressive model. Formally, this involves predicting a Wave 2 measure of the outcome with the Wave 1 measure of the causal agent, controlling the wave 1 measure of the outcome. In contrast, a synchronous auto-regressive model considers the relationships among variables within the second wave only while controlling for the lagged outcome measure. Notably, recent research has found greater support for the claims of a synchronous influence of news media use and political discussion on political knowledge gain than for lagged influence of these variables on learning about politics (Eveland, Hayes, Shah, & Kwak, in press). Given this finding and the desire to compare results with the synchronous path estimates produced by the cross-sectional and fixed-effects models, we opt to focus most of our analytic attention on synchronous auto-regressive models. Nonetheless, lagged auto-regressive models are tested and reported in Note 10.

7. Before fitting our model to the data, we estimated partial correlation coefficients between informational use of mass media and civic participation with all demographic variables being controlled. The data from both waves suggest that three different types of news consumption—online information seeking (r = .13, Wave 1; r = .16, Wave 2), newspaper use (r = .19, Wave 1; r = .15, Wave 2), and television news use (r = .16, Wave 1; r = .15, Wave 2)—are positively related with civic participation, with all the correlation coefficients being statistically significant at the .001 level. These findings of direct relationships between news consumption and participation are consistent with previous research in political communication.

8. Because this study is based on a path model approach without measurement model, four matrices are employed for model specification. A gamma matrix (γ) deals with the association between exogenous variables and endogenous ones, and a beta matrix (β) specifies the relationships among endogenous variables. As discussed earlier, our model predicts that informational media use determines citizen communication, both online and offline, which in turn shapes civic participation. Thus, gamma coefficients will be interpreted as the influences of online information seeking, newspaper reading, and television news viewing on interactive civic messaging and interpersonal political discussion. Also, beta coefficients will provide information concerning the effect of interactive civic messaging and interpersonal political discussion on civic participation. In addition, because online information seeking and newspaper and television news are conceptually exogenous, causal paths among them are not specified. Instead, they are allowed to be correlated by freeing all elements in the phi matrix (Φ). Similarly, no causal linkages between interactive civic messaging and interpersonal political discussion are specified. The corresponding covariance elements are, accordingly, freed in the psi matrix (Ψ). Both phi and psi coefficients will be interpreted as simple associations without direction.

9. The ratio of chi-square to degrees of freedom in this model is .26. In addition, the normed fit index (NFI) value, a measure of overall amount of variance explained by the theorized model, for this model equals 1. The value of non-normed fit index (NNFI), corrected NFI with model complexity considered, also indicates that this model fits the data very well: NNFI = 1. Both NFI and NNFI range from 0 to 1, and values equal to or greater than .90 indicate a good fit. SRMR for our model is .004, which shows a good fit again. In sum, there is little evidence of model inadequacy.

10. We explored two other possible auto-regressive models along with the model presented in Figure 4. The first one is a lagged auto-regressive model that estimated the relationships among Wave 1 measures of informational use of media, Wave 1 online and offline citizen communication, and Wave 2 civic participation, with Wave 1 civic participation lagged. The second lagged auto-regressive model estimated relationships among Wave 1 informational media use, Wave 2 citizen communication, and Wave 2 civic participation. In both models, the autoregressive term, Wave 1 measure of each Wave 2 variable, is included to account for the stability in the variable when estimating synchronous and lagged parameters. According to goodness-of-fit statistics, the first lagged auto-regressive model does not fit the data well, with an estimated chi-square value of 73.01 and 12 degrees of freedom, for a ratio that is well above 3. Other goodness-of-fit indices show the less than adequate model performance (RMSEA = .06, NFI = .98, NNFI = .96, SRMR = .05). This suggests that lagging the effects of information and citizen communication on participation does not produce an adequate structural model. Nonetheless, the effects of the Internet on civic participation remain largely intact, with indirect effects of Wave 1 online information seeking (.01, $p < .10$) and direct effects of Wave 1 interactive civic messaging (.04, $p < .05$) on the lagged form of Wave 2 civic participation. The second lagged model fits that data better, with an estimated chi-square value of 54.76 and 28 degrees of freedom, for a ratio that is well below 3. Other goodness-of-fit indices also perform relatively well (RMSEA = .03, NFI = .99,

NNFI = .99, SRMR = .03). This suggests that lagging the effects of information on citizen communication and participation, with the relationship between citizen communication and participation tested synchronously, does produce a well-fitting structural model. The effects of the Internet on civic participation are replicated, with indirect effects of Wave 1 online information seeking (.01, $p < .05$) and direct effects of the lagged form of Wave 2 interactive civic messaging (.12, $p < .001$) on the lagged form of Wave 2 civic participation. The superior performance of this model also lends some support to our synchronous auto-regressive modeling approach and is consistent with recent panel modeling of communication effects on political knowledge (Eveland et al., in press).

11. The slight difference in the indicators of model fit between the cross-sectional model reported in Table 2 and the model reported in Table 3 resulted from the removal of two paths in the additional analysis that were originally retained. Specifically, as seen in Figure 2, we retained a marginally significant relationship between newspaper hard news use and interactive civic messaging and the direct path between newspaper hard news use and civic participation. For the models reported in Table 3, we began by testing fully saturated mediated models and then trimmed all nonsignificant paths, resulting in the removal of these two paths as compared to the model in Figure 2.

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