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Influence of Social Media Use on Discussion Network Heterogeneity and Civic Engagement: The Moderating Role of Personality Traits

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Using original national survey data, we examine how social media use affects individuals' discussion network heterogeneity and their level of civic engagement. We also investigate the moderating role of personality traits (i.e., extraversion and openness to experiences) in this association. Results support the notion that use of social media contributes to heterogeneity of discussion networks and activities in civic life. More importantly, personality traits such as extraversion and openness to experiences were found to moderate the influence of social media on discussion network heterogeneity and civic participation, indicating that the contributing role of social media in increasing network heterogeneity and civic engagement is greater for introverted and less open individuals.

Social media platforms (e.g., Facebook and Twitter) are among the most popular Internet services. Recent years have demonstrated the importance of social media within the realm of public affairs, as well as individuals' everyday lives (Lenhart, 2009). The role of social media platforms in providing information about public affairs and offering online space for people to express their opinions and engage in a variety of activities has been increasing as users are not only obtaining news and information but they also are able to post their own thoughts and opinions (Smith, 2009). This trend seems to be continuing as social media usage greatly increases.

One of the major scholarly debates over the role of emerging digital media is whether and how the communication technologies relate to individuals' exposure to diverse viewpoints and participatory activities (Brundidge, 2010; Brundidge & Rice, 2009; Verba, Schlozman, & Brady, 1995). The growing popularity of social media platforms raises questions about their role in the democratic process: Do social

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media contribute to society by exposing individuals to diverse or heterogeneous perspectives thus allowing them to participate in civic life more often? The relationship between social media use and individuals' discussion network heterogeneity and civic participation is an important area of exploration, as both promote democratic citizenship and are key markers of deliberative and participatory democracies (Gil de Zúñiga, 2009; Gil de Zúñiga & Valenzuela, 2011; Mutz, 2006a; Sunstein, 2001).

This study seeks to better understand the role of social media in the democratic process by examining their potential as new venues for discussion network heterogeneity and civic engagement. Despite the increasing popularity of social media, little is known about how social media use influences individuals' discussion networks—that is, whether individuals' social media use contributes to the heterogeneity of their discussion networks. While a few studies have explored the association between social media (e.g., Facebook) and people's civic behaviors (e.g., Ellison, Steinfield, & Lampe, 2007; Gil de Zúñiga, Jung, & Valenzuela, 2012), they have primarily focused on the direct influence of social media on outcome variables such as civic engagement while neglecting the fact that the impact of (social) media use on citizens' discussion network and participatory behavior may depend on people's individual characteristics. Individuals seek and obtain different gratifications when they use media, such as the Internet, that, in turn, lead to various patterns of influence (Althaus & Tewksbury, 2000; Chen & Kim, in press; Kim, 2011b). When using social media, for example, introverted individuals, compared to extraverted individuals, may be more strongly motivated to interact with different types of people. As such, we argue that personality traits may moderate the influence of media use on individuals. In essence, the role of social media as a resourceful tool in facilitating individuals' heterogeneous discussion networks and their civic engagement might vary according to different personality traits (e.g., extroverts vs. introverts), which to date has not been studied empirically.

The purpose of this study is to examine how social media use (i.e., Facebook and Twitter) influences our two dependent variables of interest—discussion network heterogeneity and citizen engagement in public affairs. It also aims to fill a gap in the literature by investigating the moderating role of individuals' personal traits in the association between social media use and discussion network heterogeneity, as well as that between social media use and civic engagement. To examine those relationships, we used original survey data from a national sample of U.S. adults.

Social media and discussion network heterogeneity

Exposure to diverse viewpoints is theorized as central for creating an effective, deliberative democracy (Habermas, 1989; Huckfeldt, Beck, Dalton, & Levine, 1995). It stimulates individuals to search for information more thoroughly and to examine issues and alternatives with more scrutiny (Delli Carpini, Cook, & Jacobs, 2004). Exposure to diversity also helps individuals to comprehend the rationale and motivation of different perspectives, which increases political understanding and tolerance

(Mutz, 2002; Price, Cappella, & Nir, 2002), as well as to seek political solutions that are best for society as a whole (Garrett, 2009b). Discussion with non-like-minded people and exposure to diverse viewpoints is linked not only to facilitating the deliberative process and enhancing the quality of opinions but it is also closely linked to active citizenship by allowing individuals to express their viewpoints and become accustomed to encountering dissimilar opinions (Leighley, 1990; McLeod et al., 1999).

However, if individuals expose themselves only to like-minded people and information that supports their congenial perspectives, while ignoring contrasting viewpoints, they may become less likely to tolerate challenging opinions, contributing to a more fragmented and polarized society (Mutz, 2002; Stroud, 2010; Sunstein, 2001). Originating from Festinger's (1957) cognitive dissonance theory, which postulates that individuals tend to reduce dissonance to ease an uncomfortable psychological state, selective exposure occurs when individuals actively seek out like-minded information while avoiding challenging viewpoints. A substantial body of research has demonstrated that people selectively seek out information congruent with their own predisposition and beliefs (Klapper, 1960; Mutz, 2006b; Stroud, 2007). However, there has been controversy and inconsistent results concerning the concept of selective exposure. For example, Sears and Freedman (1967) proposed de facto selective exposure, arguing that there may be reasons behind individuals' information-seeking process other than a desire to avoid dissonance of political ideology.

Selective exposure remains highly relevant and still controversial in the contemporary digital media environment (see Bennett & Iyengar, 2008; Holbert, Garrett, & Gleason, 2010, for more in detail about debate over selective exposure both in mass media and the digital media era). Some scholars contend that selective exposure will be more likely to occur given the abundant media market (Bennett & Iyengar, 2008; Sunstein, 2001). The polarization of political discourse has become common in online news sources (Baum & Groeling, 2008), and the growing phenomenon of selective exposure in the digital media environment may have a negative impact on the democratic process, with respect to its effect on increasing political fragmentation and polarization of the public sphere (Sunstein, 2001).

However, there are psychological and structural forces at work in the contemporary media environment that could potentially counteract selective exposure. At the psychological level, people may prefer to seek opinion-reinforcing political information, but their aversion to non-like-minded viewpoints is not as strong as expected (Garrett, 2009b). A behavior-tracking study and survey data showed no evidence that individuals actively avoid challenging opinions online (Garrett, 2009a, 2009b). In terms of structural forces, Brundidge (2010) proposes the inadvertency thesis, which argues that the changing structural boundaries of the contemporary online public sphere allows individuals to inadvertently expose themselves to differing opinions. She argues that ''inadvertency is facilitated online through (a) less than perfect online selective exposure strategies, (b) nonavoidance of encounters with political difference, and (c) weakened social boundaries between far flung geographic locations, between one discursive space and the next (blurred and porous boundaries creating

increased interspatiality), between political and apolitical spaces of communication, and between the private and the public spheres" (p. 687). This indicates that individuals are still likely to be exposed to political difference, at least to some extent, through inadvertency. On the basis of the inadvertency thesis, her study offers evidence that online messaging and online news consumption have significant relationships to the heterogeneity of discussion networks.

Wojcieszak and Mutz (2009) support the notion that people inadvertently experience different political opinions with no intention of seeking political information, especially where characteristics of politics and nonpolitics exist together. They found that apolitical online group activities were more likely to contribute to exposure to cross-cutting perspectives. Similar reasoning applies to social media platforms—that is, people use social media not only for social relationships and entertainment but also for sharing information about public affairs including opportunities for community work. In addition, social networking technology also exposes people to more communication from a greater number of people and more different kinds of people, including not only their close friends but also people who are not close friends. Thus, social media create an environment where individuals can be exposed to diverse perspectives and information that otherwise might not be available. In fact, some research indicates that social media use has a positive relationship with individuals' exposure to heterogeneous perspectives. For example, Kim (2011a) demonstrated that individuals' usage of social network sites had a positive influence on their exposure to political difference when searching for information on the Internet. He explains that this may be due to the characteristics of SNSs that contribute to inadvertency, such as heterogeneity of SNS populations, hyperlinks, and interactive communication applications. Building upon previous research, we hypothesize that social media use will be positively related to individuals' discussion network heterogeneity (H1).

Social media and civic engagement

Civic participation involves voluntary engagement in civic, nonpolitical, and community-based activities (Verba et al., 1995). It includes actions such as working or volunteering for nonpolitical groups, raising money for charity, attending neighborhood meetings, and resolving community problems. Citizens' engagement in these civic activities is essential to a healthy democracy and has great value in maintaining a coherent society (Putnam, 2000; Verba et al., 1995).

With the advent of digital media, such as the Internet in the 1990s, scholars have debated the role of the Internet—whether it contributes to citizens' participatory activities. Some scholars argue that the Internet provides another platform for engagement to those who are already interested in politics and more likely to participate in civic and political activities (Norris, 2000). Others argue that it has great potential in mobilizing politically inactive people (Bimber, 1999; Krueger, 2006). Several studies have also found that online communication strengthens

existing networks, establishes new networks (Kavanaugh, Carroll, Rosson, Zin, & Reese, 2005), and enhances the positive links between political talk and community engagement (McLeod et al., 1999). As such, literature suggests that Internet use, in general, is positively associated with citizens' participatory activities in civic life, whereas consumer-oriented activities and private entertainment online have no bearing on civic engagement (see Katz & Rice, 2002, for assessments of the Internet's effects across years; Moy, Manosevitch, Stamm, & Dunsmore, 2005).

The growing popularity of social media has prompted researchers to examine its effects on civic participation. Several studies indicate that social media use is positively related to greater civic participation (Ellison et al., 2007; Zhang, Johnson, Seltzer, & Bichard, 2010). This is because SNSs are designed for maintaining or building relationships with others, which increases both bonding and bridging social capital, creating the potential to foster civic activities such as community involvement (Ellison et al., 2007; Shirky, 2008; Zhang et al., 2010).

Social media such as Facebook and Twitter are connected social networks based on interpersonal relationships. Unlike many anonymous online spaces, such as blogs, online news, or discussion forums where individuals' attention is based on their specific interest or partisanship, social media create a relationship-driven network or a ''*nonymous*'' (i.e., the opposite of ''anonymous'') relationship (Zhao, Grasmuck, & Martin, 2008, p. 1818). These *nonymous* interactions with one another in the networked space may potentially result in increasing individuals' engagement in civic activities by making people feel social norms. For example, people may be more interested in participating in and supporting activities that their friends share through social media, and thus more willing to attend those activities online or offline. This process of building identity and meaning through networked relationships on social media creates shared experiences, knowledge, and tasks, which are the social glue and foundation of civic society (Bimber, 2005).

In addition, social media connect individuals from diverse offline social networks, such as contacts from every school they have attended and every workplace where they have been employed. Individuals' online connections are based not only on interests but also on their offline contacts and the social networks of these contacts (Ellison et al., 2007). These contacts may have similar social, professional, or geographic backgrounds but do not necessarily possess the same interests and viewpoints. Information on social media is provided by and flows through these diverse online and offline social contacts. Thus, individuals who build and maintain relationships with others by using social media can receive mobilizing information and news about a variety of social events, thus expanding their opportunities to engage in civic activities.

In sum, we argue that the dissemination and sharing of information among participants, through online social ties and interpersonal relationships built and maintained via social media, is the reason social media use may contribute to civic participation. The insights gained from the previous discussion of the literature lead us to hypothesize that there is a positive association between social media use and individuals' civic engagement (H2).

Moderating role of personality traits: Extraversion and openness to experience

In addition to exploring the associations of social media use with network heterogeneity and civic participation, this study investigates the moderating role of individuals' personality traits on those relationships. It has been demonstrated that individual differences, including psychological factors, may interact with influences of media use on individuals' behavioral consequences, and personality traits have been shown to account for different behaviors. We will consider two personality traits—extraversion and openness to experiences—because those are among the most relevant personality traits when it comes to examining the relationships among social media use, discussion network heterogeneity, and civic participation.

Extraversion is a strong predictor of involvement in civic matters (Kavanaugh et al., 2005; Mondak, Hibbing, Canache, Seligson, & Anderson, 2000). Costa and McCrae (1992) argue that extraverts are more likely to participate in social activities, and other results indicate that people who have a higher level of extraversion and openness are more likely to participate in civic activities, such as volunteering and community activities (Elshaug & Metzer, 2001). Similarly, openness to new experiences also has a positive association with network heterogeneity and civic participation, as individuals high in openness tend to seek new adventures, novel experiences, and unique ideas (Bekkers, 2005; McCrae, 1996). As such, we know that there is a positive effect of personality traits (e.g., openness and extraversion) on discussion network heterogeneity and citizens' civic engagement. However, we do not know how and whether such personality traits influence the relationship between social media use and individuals' network heterogeneity, on the one hand, and civic participation, on the other. There appears to be no research that has examined the moderating effect of social media use and personality traits on the heterogeneity of discussion networks and civic engagement. It has been demonstrated that individual differences, including psychological factors, may interact with influences of media use on individuals' behavioral consequences (Althaus & Tewksbury, 2000). Thus it is plausible to expect that the effects of social media on discussion networks and civic engagement may differ depending on individuals' personality traits, such as extraversion and openness to experience.

Because individuals who exhibit high levels of extraversion tend to be gregarious and interact more often with a variety of people compared to those who are less extraverted (Eysenck, 1967), they are likely to utilize social media platforms for expanding their networks and interactions. The idea here is that people who are outgoing and open to experience, compared to introverted or less-open individuals, might gain more social benefits when using social media since they already have larger social networks and greater involvement in various activities offline. As a result, they may interact more actively with others through social media, thereby leading to higher levels of discussion network heterogeneity and civic engagement.

However, there is also reason to expect that the positive influence of social media use might be strong for introverted and less open individuals than for extraverted

and more open ones. From the perspective of weakened structural boundaries, social network boundaries formed on social media such as Facebook and Twitter are more porous, allowing diverse information to flow through the networks easily and immediately, without passing through one gatekeeper after another. One may argue that introverts and those less open to experience could be more active on social media platforms than they are in offline settings in interactions with others and sharing information and experiences. In those situations, introverts may have opportunities for more heterogeneous discussion networks and engagement in civic activities. For example, the intuitive interface designs on Facebook allow for effortless interaction, such as clicking the "like" button provided below each comment or photograph. The design for posting short messages also allows people to share their thoughts easily. These features of social media may benefit the knowledge and interpersonal relationships of psychologically introverted people, who are less likely to connect with others. Shah, Cho, Eveland, & Kwak (2005) argue that having more contacts and increasing opportunities to engage in discussion or online interactive messaging, which may permit people to encounter opportunities for civic participation and increase their interest in civic activities, has a positive impact on individuals' civic participation. Because social media make the interaction with others easier, in turn facilitating the engagement in one's online community, it is likely that social media use also encourages introverted or less open people to participate more actively in civic events.

A study examining personality types and motivation for using Facebook shows that extraverts belong to more groups on Facebook, but do not necessarily possess a larger number of friends on Facebook than people who score lower on extraversion. This may indicate that extraverts use social media platforms as a social tool instead of an alternative to social activities (Ross et al., 2009). However, for those who are less extroverted and less open to new experiences, social media could be their main tool to interact with others.

Therefore, another purpose of this study is to examine the potential interaction effects of personality traits and social media use on discussion network heterogeneity and civic participation, which to date has not been explored. Competing arguments of reasoning and a lack of empirical evidence do not provide sufficient grounds to propose directional hypotheses regarding the moderating role of personality traits. Rather, those considerations lead us to state two research questions. First, how do personality traits (i.e., extraversion and openness to experience) and social media use interact to influence the respondents' discussion network heterogeneity (RQ1)? Second, how do personality traits (i.e., extraversion and openness to experience) and social media use interact to influence citizens' civic engagement (RQ2)?

Method

Participants
To test the hypotheses and research questions, an online survey was administered to U.S. adults nationwide shortly after the 2008 presidential election—from December

15, 2008, to January 5, 2009. The dataset used in this study is based on an online panel administered by the Media Research Laboratory at the University of Texas at Austin. For a more accurate representation of the U.S. population, the Media Research Laboratory based this national sample on two U.S. Census variables: gender and age. After matching a 10,000 random draw to those demographic variables, 1,432 e-mail addresses were found invalid. The remaining 8,568 panel participants were invited to answer the survey via an e-mail invitation with 1,159 participants who completed the survey, yielding a 22.8% response rate (AAPOR, 2008, pp. 34–35). While the response rate was relatively low, it was within the acceptable range for panel web-based surveys (Sax, Gilmartin, & Bryant, 2003). Demographic characteristics of the current sample is an average age of about 45 years; 67% of the participants were female and more than eighty percentage 80 percent (84%) were white; the median education level and household income were 2-year college degree and $50,000–$59,999, respectively.

Measures
Two dependent variables (i.e., discussion network heterogeneity and civic engagement) are explored in this study along with a set of control variables and social media use and personality traits (i.e., extraversion and openness to experience) as the key independent variables.

Discussion network heterogeneity
Discussion network heterogeneity was measured based on previous studies (McLeod et al., 1999; Scheufele, Hardy, Brossard, Waismel-Manor, & Nisbet, 2006). Using a 10-point scale, respondents were asked how often they talked about politics or public affairs with (a) people outside their family who do not share their ethnicity, socio-economic status, or gender; (b) people who disagree with their views; and (c) people who agree with their views. Responses for ''agree with'' were reverse coded. The three items were averaged to form an index of discussion network heterogeneity ($\alpha = .84$, $M = 3.90$, $SD = 1.23$).

Civic engagement
Items for civic engagement, adopted from previous research (e.g., Shah et al., 2005), asked how often participants had been involved in the following activities: (a) worked or volunteered for nonpolitical groups, such as a community project, etc.; (b) raised money for a charity or participated in a run/walk/bike for charity; (c) attended a meeting to discuss neighborhood problems; (d) bought a certain product or service because you liked the social or political values of the company; (e) banned a product or service because you disagree with the social or political values of the company. Respondents answered on a 10-point scale and scores were averaged to create an index ($\alpha = .81$, $M = 3.73$, $SD = 2.32$).

Social media use
This variable was measured by an averaged index of two items tapping into respondents' social networking sites and micro-blogging use. Respondents were asked how

often they used the Internet for accessing social networking sites such as Facebook and using Twitter to get news, respectively. They answered using a Likert-type 10-point scale, where 1 was "*never*" and 10 was "*very often*" ($r = .37$, $p < .001$, $M = 5.37$, $SD = 4.41$).

Personality traits: Extraversion and openness to experience
The personality traits (extraversion and openness to experience) were measured using part of the 10-Item Personality Inventory (Gosling, Rentfrow, & Swann, 2003). This scale was developed as a brief measure of the Big-Five dimensions of personality (two items per dimension) and showed adequate levels of reliability and validity (Gosling et al., 2003). While there are well-established instruments for personality dimensions—for example, the NEO Five-Factor Inventory, which has 60 items—the 10-Item Personality Inventory has been adopted and validated by numerous studies since its introduction (e.g., Grant, 2008). Two dimensions of personality traits—extraversion and openness to experience—were measured and used in this study, which are relevant to the relationships among social media use, network heterogeneity, and civic engagement. Each personal trait was measured with two items. Respondents rated the extent to which they aligned to different personality characteristics on a scale ranging from 1 (strongly disagree) to 10 (strongly agree). Extraversion was measured as a scale averaging two items including "reserved and quiet" (reversed) and "extraverted and enthusiastic" ($r = .43$, $p < .001$, $M = 5.68$, $SD = 2.27$). Openness to experiences was constructed as a scale averaging the following two items: "conventional and uncreative" (reversed) and "open to new experiences and complex" ($r = .29$, $p < .001$, $M = 7.10$, $SD = 1.81$).

Control variables
Previous studies have identified that several demographic variables, news media use, and individuals' predispositions are associated with citizens' participatory activities and network diversity (Brundidge, 2010; Kim, 2011a). To isolate the independent contribution of personality traits and social media use to our two dependent variables (i.e., network heterogeneity and civic engagement), we controlled for demographic variables (age, gender, race, income, and education), news media use, political efficacy, and strength of partisanship.

Demographic variables
Five demographic control variables were included in our models. Respondents were asked to record their age ($M = 45.79$, $SD = 11.31$), gender (Male $= 33\%$, Female $= 67\%$), and race (White $= 84\%$) in the survey. They were also asked about their highest level of formal education attained, which ranged from 1, indicating "less than high school," to 8, indicating "doctoral degree" ($M = 4.15$, $SD = 1.57$, $Mdn = 2$-year college degree). Income was measured with 15 categories, with 1 indicating under \$20,000 and 15 indicating over \$150,000 ($M = 6.05$, $SD = 4.03$, $Mdn = \$50,000$ to \$59,999).

News media use

Respondents were asked to rate on a 7-point scale how often they used news media. The survey included eight items: network TV news, cable TV news, local TV news, radio news, print newspapers, online newspapers, print news magazines, and online news magazines ($\alpha = .68$, $M = 2.92$, $SD = 1.10$).

Political efficacy

Political efficacy was measured with the item: ''I think people like me can influence government,'' and ranged from $1 =$ ''*not at all*'' to $10 =$ ''*all the time*'' ($M = 4.97$, $SD = 2.54$).

Strength of party identification

The strength of respondents' party identification was measured with an 11-point scale ranging from strong Republican to strong Democrat. This item was folded into a 6-point scale and recoded ranging from weak partisanship to strong partisanship ($M = 3.31$, $SD = 1.79$).

Results

To test the proposed hypotheses and examine the moderating role of personality traits on discussion network heterogeneity and civic engagement, we employed two sets of hierarchical ordinary least squares (OLS) regressions, one for each dependent variable. The variables were entered in separate blocks. The respondents' demographics, news media use, political efficacy, and partisanship were entered as control variables in the first block, followed by the main effects of personality traits, and social media use in the second and the third block, respectively. Finally, two interaction terms (social media use × extraversion and social media use × openness) were created and entered in the final block. This procedure allowed us to assess the influence of each block of variables on each dependent variable and, most importantly, to examine the independent variables and interaction effects of social media use and personality traits after other confounding variables had been taken into consideration.[1] Table 1 shows findings concerning the hypotheses.

Discussion network heterogeneity

As presented in Table 1, the total variance in discussion network heterogeneity explained by the regression model was 14.1% (Model 1). Among the control variables, news media use and political efficacy were positively associated with network heterogeneity while strength of partisanship and income were found to have a negative relationship with heterogeneity of discussion network. We hypothesized that the use of social media will be positively related to respondents' discussion network heterogeneity (H1). The first hypothesis was supported with frequency of social media use positively predicting respondents' discussion network heterogeneity ($\beta = 0.12$, $p < .001$), controlling for demographic variables, political orientations, and news media use.

Table 1 Predicting Discussion Network Heterogeneity and Civic Participation

	Discussion Network Heterogeneity (Model 1)	Civic Participation (Model 2)
Block 1: Control Variables		
Age	−0.02	−0.02
Gender (female)	−0.02	0.08**
Education	0.00	0.13***
Income	−0.09*	0.08**
Race/Ethnicity (white)	0.01	0.03
News media use	0.18***	0.22***
Political efficacy	0.09**	0.18**
Strength of partisanship	−0.11***	0.02
Incremental R^2 (%)	10.2***	21.6***
Block 2: Personality Traits		
Extraversion	0.07*	0.06#
Openness to experience	0.13***	0.09**
Incremental R^2 (%)	2.7***	1.5***
Block 3: Social Media Use		
Social Media Use	0.12***	0.21***
Incremental R^2 (%)	1.2***	3.2***
Total R^2 (%)	14.1***	26.3***

Note: Sample size = 958; Cell entries are final-entry OLS standardized coefficients.
#$p < .10$; *$p < .05$; **$p < .01$; ***$p < .001$.

Turning to the interaction effects of social media and personality traits, this study inquires about the ways in which personality traits may moderate the relationship of social media use with network heterogeneity (RQ1). As shown in Table 2, after the control, extraversion turned out to significantly and negatively moderate the relationships between social media use and respondents' discussion network heterogeneity ($\beta = -0.06$, $p < .05$). Openness, however, was not a significant moderator while it had a significant main effect on network heterogeneity. For a better understanding of this relationship, the interaction between social media use and extraversion on discussion network heterogeneity was plotted in Figure 1 (on the left). The graph shows that individuals low in extraversion tended to report higher levels of network heterogeneity when they reported greater amounts of social media use compared to those who are high in extraversion.

Civic engagement
We hypothesized that there will be a positive association between social media use and individuals' civic engagement (H2). The regression model explained 26.3% of the variance in civic participation (see Table 1, Model 2). Gender, education, income, news media use, and political efficacy were significantly associated with

Table 2 Interactive Effects of Social Media Use and Personality Traits on Network Heterogeneity and Civic Participation

	Discussion Network Heterogeneity	Civic Participation
All Prior Blocks (R^2, %)	14.1***	26.3***
Block 4: Interaction Terms		
Social media use × Extraversion	−0.06*	−0.03
Social media use × Openness	−0.01	−0.07*
Incremental R^2 (%)	0.5#	0.7*
Total R^2 (%)	14.6***	27***

Note: Prior blocks include age, gender, education, household income, ethnicity, news media use, political efficacy, strength of partisanship, social media use, extraversion, and openness to experience. Entries are OLS standardized coefficients after the control. Sample size = 958.
#$p < .10$; * $p < .05$; ** $p < .01$; *** $p < .001$.
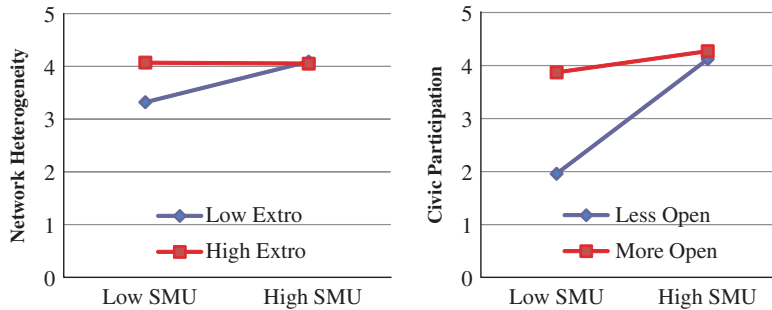
Figure 1 Interaction relationships of social media use (SMU) and personality traits on discussion network heterogeneity and civic participation.

civic participation. However, ethnicity and strength of partisanship were not significantly related to respondents' civic participation. As predicted, the use of social media was positively associated with civic participation ($\beta = 0.21$, $p < .001$), even when controlling for demographic variables, political orientations, and news media use.

With respect to RQ2, concerning potential interactions between social media use and personality traits for civic participation, results showed that the interaction term between social media use and openness was significant (see Table 2). After the control, openness to experience was found to significantly and negatively moderate the relationships between respondents' social media use and their participation in civic activities ($\beta = -0.07$, $p < .05$). Figure 1 (on the right) presents this interaction relationship, suggesting that the positive role of social media use in promoting citizens' participation in civic activities was stronger for less open respondents compared to more open individuals.

Discussion

This article sheds more light on how social media use and personality traits may influence individuals' political discussion network heterogeneity and civic participatory behaviors. First, this study examined the relationship of social media use and individuals' discussion network heterogeneity and engagement in civic activities. Results support the idea that use of social media contributes to the heterogeneity of people's discussion networks and their activities in civic life. More importantly, results indicate that the role of social media use in facilitating the way in which people talk to heterogeneous discussion partners and participate in civic activities is moderated by personality traits. Extraversion was found to moderate the effects of social media use on network heterogeneity. Essentially, when introverted individuals used social media more often, they tended to talk more frequently with heterogeneous people, compared to more extraverted individuals. Similarly, the positive role of social media in promoting citizens' engagement in civic activities was stronger for less open individuals than for more open people.

Overall, the findings of this study imply that greater social media use is significantly associated with greater heterogeneity in discussion networks and greater civic participation, although the magnitude is small. These findings are consistent with optimistic views on the role of the Internet in enhancing democracy by increasing citizens' political engagement (e.g., Katz & Rice, 2002; Kenski & Stroud, 2006; Shah et al., 2005). Previous research found that Internet use—operationalized as online news consumption—has a significant impact on individuals' heterogeneity of political discussion networks (Brundidge, 2010; Brundidge & Rice, 2009). Our findings additionally suggest that not only news consumption over the Internet may help foster a healthy democracy but social media use such as Facebook and Twitter might also have a potential benefit to some extent in building a stronger democratic society by expanding individuals' heterogeneous discussion networks and facilitating civic engagement, although the magnitude is small. Given the tiny effect sizes, it is cautious to say that social media have appreciable impact on these outcomes. However, we can argue that the results of the study should at least ease concerns that the Internet may lead to political fragmentation and polarization by which people, in utilizing selective exposure with increased control over communication online, expose themselves mainly to homogeneous perspectives and avoid political difference (Sunstein, 2001).

In particular, the moderating effect of personality traits on network heterogeneity and civic participation suggests that introverted and less active individuals may expand their social boundaries and civic involvement through social media use, thus increasing the chances—and making it more likely—of having heterogeneous discussions and engaging in civic activities under those circumstances. This is indeed positive news. Social media can be a useful tool for introverted individuals in helping them expand their social boundaries and civic life by providing them with the necessary information exchanges and social interactions.

As encouraging as these findings might be, there are several limitations that must be addressed and possibly accounted for in future research. One limitation relates to the measurement of personality traits, network heterogeneity, and social media use. While the brief indices of personal traits used in this study have been validated and employed widely in previous research (Back et al., 2010; Grant, 2008), the measurement of extraversion and openness to new experience showed a moderate level of measurement reliability. Due to the somewhat low measurement reliability, the associations of variables of interest may have been attenuated. Future studies should consider the inclusion of more items in the composite index variable in order to achieve more robust results (e.g., Lambe & Reineke, 2009). Although the reliability estimate for discussion network heterogeneity, composed of the three items, was satisfactory, the extent to which respondents have political conversations with heterogeneous discussion partners in terms of gender, race/ethnicity, and socio-economic status was measured with a single item. We should also acknowledge weakness of the social media use items. When the data were collected from December 2008 to January 2009, social network sites such as Facebook and Twitter were not the dominant social media platforms that they have become today. In fact, they were quite different platforms. Thus, the narrowness of the measures may call the validity of social media use measures into question. Nevertheless, we decided to combine social network site use and Twitter use as a social media use variable for the sake of capturing the role of social media as a whole rather than of each social media application, and especially considering that Twitter use, which has been relatively less studied compared to SNSs, is one of the fastest growing social media platforms.[2] Future research, therefore, could address these measurement shortcomings by having more valid measurement items.

It is important to note that the significant associations found in this study were not large even though they were statistically significant. The incremental *R*-squares revealed that social media variable and interaction terms between personal traits and social media use explained a small amount of additional variance after all other control variables were taken into account. Given the large sample size of the study, most associations yield only a weak strength of beta or association, although they reach statistical significance. The magnitude of the findings should then be considered within this context as statistically significant relationships, not to be confused with the magnitude of substantive impact; also interpretation of results should be tempered. The small size of the relationship can be partially explained by relatively less popularity of social media platforms at the time the survey was conducted (December 2008 to January 2009) and several measurement shortcomings mentioned above. Nevertheless, it must be also noted that all the significant relationships are true even after exhaustively controlling for a host of other variables including the respondents' demographic variables, news media use, and political predispositions. Finally, the analysis of one set of cross-sectional data raises concerns about causal directions. On the basis of previous studies, we have assumed that social media use has a causal impact on discussion network

heterogeneity and civic engagement. One may argue that the causal directions might be reversed. That is, it is still possible that individuals who are more participatory and have heterogeneous networks are also more likely to use social media. However, social media use is a widespread, personal phenomenon not likely arising from how much civic activity one engages in. In addition, given the operationalization of frequencies of discussion network heterogeneity and social media use, the reflection that those who talk more frequently with heterogeneous people are likely to use social media more often seems to make less sense than the inverse. Indeed, many other studies using cross-sectional data have assumed and successfully demonstrated that media consumption, including Internet use, has causal impacts on political variables, such as political knowledge, civic and political participation, network heterogeneity, and exposure to diverse perspectives (Brundidge, 2010; Jung, Kim, & Gil de Zúñiga, 2011; Kenski & Stroud, 2006; Wojcieszak & Mutz, 2009). Panel studies have also proved this causal direction, thereby lending support to our causality approach. Shah et al. (2005), by using panel data, demonstrated that it is media use, including online and traditional news media, that contributes to interpersonal political discussion and civic participation. Nevertheless, a nonrecursive model which takes into account the plausible circular causation between social media use and network heterogeneity and participation should help to parse out this relationship. This is, of course, a suggestion for future research. Another venue for future research would be to examine various dimensions of civic engagement, such as community involvement, group membership, social capital, and political engagement (Moy et al., 2005; Putnam, 2000), rather than conflating the variety of civic participation with the amount of engagement. For example, one would expect that openness and extraversion both work differently for social (e.g., attending a meeting) and private (e.g., boycotting) acts.

Despite its limitations, this study contributes to our understanding of the role of emerging social media in increasing political conversations among diverse citizens and participatory activities in civic life. Notably, the contribution of these emerging communication technologies will likely grow, rather than diminish, given the fast growing popularity of social media. This study makes an important contribution to the current literature in that it takes into account the role of personality traits in the relationship between social media use and discussion network heterogeneity and civic engagement. Although scholars have focused primarily on the impact of media use, including digital media on network heterogeneity and participatory activities, the role that individuals' personality traits play in influencing this relationship has not been well researched. This is the first analysis to find interaction relationships between social media and personality traits in influencing discussion network heterogeneity and civic participation. This investigation offers new empirical evidence that social media use has a positive relationship with network heterogeneity and civic engagement; and the contributing role of social media was particularly strong for those who are introverted and less open individuals. These findings certainly encourage future research to address this intersection in greater detail.

Notes

1 Descriptive statistics and correlations among variables are available upon request from the first author.
2 Given the relatively low correlation between social network site use and Twitter use, it is possible that there are some distinct uses between SNS and Twitter that do not seem to be analogous. One may wonder whether results for SNSs might be somewhat different than for Twitter when analyzed independently. Indeed, of SNS users, 69.2% reported they never used Twitter while 30.8% of SNS users were Twitter users. To explore whether results for SNS and Twitter are different, additional analyses were employed. SNS use and Twitter use were analyzed as separate variables. The analyses produced similar patterns of results, as observed with the combined social media use, except the non-significant interaction effects of SNS and openness on civic engagement (For Network Heterogeneity: SNS use $\beta = 0.081$, p < .05; SNS $\times$ Extraversion $\beta = -0.050$, p < .10; Twitter use $\beta = .148$, $p < .001$; Twitter $\times$ Extraversion $\beta = -0.072$, $p < .05$. For Civic Engagement: SNS use $\beta = 0.140$, $p < .001$; SNS $\times$ Openness $\beta = -0.033$, $p = $ ns; Twitter use $\beta = 0.197$, $p < .001$; Twitter $\times$ Openness $\beta = -0.102$, $p < .001$.).

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