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Article

The mobilization effect of social media use: an instrumental variable approach

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Abstract

Social media has been considered to facilitate more online political participation (OPP) due to being less bounded by time and space constraints. However, in the context of normalization theory, social media use (SMU) might merely reflect the status quo, not facilitating additional engagement. Although extant studies on 'who participates online' raise the question of the critical factors of OPP, these studies only consider whether contacts between individuals have increased. Furthermore, according to mobilization theory, the effect of networks composed by SMU on OPP was empirically vague. Whether mobilization results in increased or decreased OPP may vary depending on the characteristics of the network. We exploit an instrumental variable to address these limitations and lacunas. The reasons are as follows: Firstly, without using an instrumental variable, adequately verifying the mobilization hypothesis is challenging due to reverse causality and contrasting expectations derived from normalization theory. Secondly, while the coefficient's sign is crucial for measuring the effects of homophily and heterophily, not using instrumental variables risks underestimating these effects. In conclusion, the models that employ the instrumental variable demonstrate a considerably larger effect size compared to others. Therefore, it appears that greater SMU correlates with increased OPP, supporting the theoretical claims that social media can promote participation and the mobilization hypothesis.

Keywords: online political participation, mobilization, normalization, homophily, heterophily

Introduction

The concept of political participation has expanded over the years to include a range of activities beyond traditional forms of involvement, such as protesting and volunteering for social causes (Ruess et al., 2021; Theocharis & van Deth, 2018). Social media platforms like Facebook and Twitter (X) have become major, and in some cases dominant, tools for political participation. The rise of social media has further facilitated and amplified new forms of political participation (Jost et al., 2018; Kim, 2015; Oser

Availability of data and material
The data (Korean Media Panel Survey) that support this study are available from KISDISTAT homepage (https://stat.kisdi.re.kr/kor/contents/ContentsList.html?subject=&sub_div=E).

et al., 2013; Vaccari & Valeriani, 2021). While social media has become a prevalent means of social interaction due to its time- and cost-effectiveness (Matusitz, 2022), some researchers in the fields of democracy and participation have been skeptical or hesitant about the value of social media-based political action (Theocharis & Lowe, 2016; Vromen et al., 2016).

Participation, a form of communication (Hoffman, 2012), is an intrinsically voluntary activity involving 'a complex process that includes doing, talking, thinking, feeling, and belonging' as well as 'action, e.g., talking with someone, and connection, e.g., feeling that one takes part' (Hrastinski, 2009, p. 79). Moreover, political participation encompasses all dimensions of social activity designed directly to influence government agencies and the policy process, or indirectly to impact civil society, or which attempt to alter systematic patterns of social behavior (Norris, 2002, p. 16). This includes activities such as political discussion, social media engagement, and information seeking (Kim & Hoewe, 2020; Woo & Kim, 2009). Given these characteristics of participation and political participation, we can consider online political participation (OPP), a newer form of political involvement, to include social media-based political actions within the broader concept of political participation (Theocharis & Lowe, 2016; Vromen et al., 2016).

OPP is a type of political participation with unique attributes compared to traditional, offline participation. Specifically, OPP differs from traditional offline participation in that it utilizes new digital channels (Koc-Michalska & Lilleker, 2017; Lilleker & Koc-Michalska, 2018; Oser et al., 2013). Many studies have been conducted on the technical aspects of OPP and the factors that predict and influence it across various fields and countries. Studies on OPP typically examine factors such as a person's demographic or political traits influencing their level of online participation (Barrett & Brunton-Smith, 2017; Kitanova, 2020; Oser & Boulianne, 2020), the impact of using new devices on participation levels moderated by a person's digital literacy (Büchi & Vogler, 2017; Yue et al., 2019), and the interaction effect of both these factors (Ashley et al., 2017; Guess & Munger, 2023; Park, 2018). These articles focus more on who participates more frequently rather than how participants engage more frequently. The question of who participates addresses between-participant differences, whereas how participants engage concerns within-participant dynamics. This distinction necessitates an alternative methodological approach and a refined strategy for controlling the endogeneity of time-varying variables. Unfortunately, these crucial concerns remain under-addressed in the existing body of literature. This study poses the research question, 'How does the use of social media influence individuals' levels of OPP?' The problem is that social media use (SMU) is influenced not only by various personal characteristics such as political attention, political awareness, and political sensitivity but also by online participation, the dependent variable. By exploring this question, this study aims to examine the extent to which this relationship can be empirically established while accounting for potential endogeneity issues.

This study contributes to the existing body of research in several ways. First, it examines the role of SMU on OPP, focusing on contrasting theoretical expectations in the literature. While this study was not able to directly measure the affiliated network, we assumed that the effect might vary depending on the characteristics of the network to which the participant belongs and explored this aspect. In doing so, this study provides further insights into the dynamics of social media and OPP, contributing to the understanding of online political mobilization. Second, it employs instrumental

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variable estimation with a fixed-effect model in the analysis to address potential endogeneity issues. This approach is significant not only for its methodological implications but also for distinguishing this study's research questions from previous research that focused on between-variation. In so doing, this study offers clues for understanding the heterogeneous empirical results. Lastly, compared to most previous studies that use one-year cross-sectional data, this study utilizes panel data to enhance the statistical evidence. The structure of this study is as follows: the next section reviews related literature and discusses the impact of SMU on OPP based on various theories. The third and fourth sections describe the research methodology and variables. The fifth section presents the analysis results, and the final section discusses the practical and theoretical implications and potential limitations of the study.

Related Literature

Controversy over online political participation

There is ongoing disagreement in the literature on OPP, with some researchers arguing that OPP reinforces (i.e., normalizes) existing patterns of offline political participation, while others emphasize that social media can facilitate (i.e., mobilize) political engagement. Theories put forward by the former group are called normalization theories, while those proposed by the latter are referred to as mobilization theories. Normalization theories focus on the existing network structure, which reflects the status quo. According to normalization theorists, while it may appear that SMU brings about social change, these changes are largely driven by offline political dynamics in traditional political processes, and the impact of SMU is limited (Gerl et al., 2018; Mejias, 2010). On the other hand, mobilization theories focus on the horizontal and decentralized networks that are created and reinforced through the use of social media. Mobilization theorists generally posit that as the communication network becomes more connected and participatory through SMU, the population using the platform gains increased access to information, more opportunities to participate in public discussion, and greater capacity for collective action (Lilleker & Koc-Michalska, 2018; Shirky, 2011). They also believe that widespread SMU will promote the sharing of opinions in the public sphere, gradually building a framework for citizen participation over time (Boulianne, 2018; Shirky, 2013). Consequently, one's perceived impact of SMU on OPP may depend on his/her acceptance of certain assumptions regarding network properties.

In addition to the divide between mobilization and normalization theories previously mentioned, there are two other notable strands of research within the field of OPP. One strand focuses on identifying the characteristics of individuals who participate online and primarily employs the resources approach (Best & Krueger, 2005; Boulianne, 2018; Ruess et al., 2023; Smith, 2013; Vasilescu et al., 2014; Wang et al., 2018). This strand, which generally assumes that SMU leads to OPP and that the network structure is decentralized and distributed, examines differences between individuals (i.e., between variations). The other strand of research on OPP focuses on examining the ways in which individuals engage in political activity. In doing so, it refers to social learning mechanisms and information exchange theories to understand the impact of SMU on OPP (Velasquez, 2012; Yamamoto et al., 2020). This area of research examines changes within an

individual over time (i.e., within variations), taking into consideration that traditional resources related to connection intensity within a network are less likely to change over time. The latter strand of research on OPP implicitly assumes the status quo and may be more suitable for measuring the impact of an individual's SMU on OPP, regardless of income, gender, age, and educational attainment. However, there is a significant risk of endogeneity in studies that adopt this assumption.

Normalization and mobilization

Normalization theories posit that the political potential of social media is primarily utilized by individuals who are already politically active and engaged. In other words, these theories propose that social media usage for political purposes does not significantly enhance overall participation (Chadwick, 2006; Gerl et al., 2018). This is attributed to preexisting inequalities in material, social, and political resources that also lead to disparities in online participation. This phenomenon, referred to as the 'digital divide,' closely mirrors disparities in offline participation among socio-demographic groups (Castells, 2008; Hirzalla et al., 2011; O'Neil, 2017; Pariser, 2011; Strauß et al., 2020; van Dijk, 2020).

Research on the digital divide, sometimes used interchangeably with normalization, has broadly examined two aspects of SMU: intensity and forms (Hirzalla et al., 2011). Studies have shown that differences in motivational, material, and skills access contribute to three socio-demographic gaps in most developed and democratic countries regarding the intensity of SMU: a 'socioeconomic gap,' a 'gender gap,' and an 'age gap' (di Gennaro & Dutton, 2006; Quintelier & Vissers, 2008). In terms of forms of SMU, research has focused on how access differences create or maintain a 'democratic divide' between those who can and cannot use the Internet and social media for political purposes (Matthews, 2021; Mossberger et al., 2003; Norris, 2001). These trends have led normalization theorists to view social media as reinforcing the status quo (e.g., Dalton, 2017), and they generally suggest that OPP is primarily influenced by political and social resources or a reflection of offline political participation (Bonfadelli, 2002; Matthews, 2021; Oates et al., 2006; van Dijk, 2005, 2006). However, it is important to note that digital divides are caused by differences in resources between individuals or groups, and socio-demographics alone do not fully explain differences in SMU (Hirzalla et al., 2011).[1]

Mobilization theories emphasize how social media can facilitate politically-motivated activities, serving as a political forum where individuals can develop civic skills and acquire the knowledge necessary for political engagement (e.g., Kann et al., 2007; Theocharis & van Deth, 2017; Valenzuela, 2013). According to Hirzalla et al. (2011), mobilization claims involve four types of OPP. First, there are studies on 'digital activism,' which refers to confrontational, sometimes highly radical, forms of interaction between citizens and political or economic elites (e.g., Dahlberg & Siapera, 2007; George & Leidner, 2019). Second, studies examine democratic conduct in discussions on web forums and social networking sites, with some scholars considering whether social media is realizing a new iteration of the public sphere concept (e.g., Bennett & Pfetsch, 2018; Dahlgren, 2005). Third, a body of research examines how individuals utilize the informative or educational potential of websites

[1] Socio-demographic differences in social media use can be attributed to 'mediation' by material, political, or social resources (Hirzalla et al., 2011; Selwyn et al., 2005).

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with politically or civically oriented content. These studies often aim to demonstrate the wealth of information available online to the general public, and how social media grants new freedoms to non-governmental organizations (NGOs), governments, and individual political entrepreneurs to disseminate their messages (Feezell et al., 2016; Montgomery et al., 2004). Fourth, much research oriented towards mobilization focuses on the concept of 'e-democracy,' which refers to an interactive online environment where citizens can educate themselves about and communicate with political representatives (Aichholzer & Rose, 2020; Chadwick, 2006).

Informed by the existing literature, we can summarize that normalization theories focus on citizens' general abilities and goals, while mobilization theories examine the potential and actual instances of political activity on social media (Hirzalla et al., 2011). Normalization theories concentrate on identifying who participates and the socio-demographic differences among participants. According to normalization theory, OPP is seen as one of the socio-demographic characteristics of an individual. Therefore, it does not significantly increase or decrease depending on SMU, especially in estimates using a model with fixed individual characteristics. In contrast, mobilization theories are more interested in how participants engage in the political forum, how their behavior changes over time, and the features and characteristics of networks that facilitate and enable OPP. According to mobilization theory, as the average individual's use of social media increases, so does the level of OPP. While these two theories present antithetical expectations, which one has more explanatory power in the current situation has not yet been empirically tested.

Considering the debate on whether SMU leads to normalization (where online political engagement mirrors existing offline patterns) or mobilization (acting as a catalyst for increased and diverse political participation), our first hypothesis is:

- Hypothesis 1: Social media use leads to mobilization, changing the levels of OPP among users.

Homophily and heterophily

If the use of social media has a mobilization effect, what becomes important are the consequences of this mobilization. While most studies assume that it leads to an increase in OPP, this outcome can depend on the characteristics of the network, such as homophily or heterophily.

Homophily, the tendency of individuals to form relationships with others similar to themselves, is based on individual traits such as age, gender, race, educational attainment, or personality, or on group membership or shared experiences (Bond & Sweitzer, 2022; Boutyline & Willer, 2016; Granovetter, 1983; McPherson et al., 2001). This tendency can lead to the formation of homophilous clusters within networks, where individuals with similar characteristics or interests are more likely to connect. It is widely accepted that homophilous clusters play a significant role in promoting political participation (Christakis & Fowler, 2009; Kim & Chen, 2016; McPherson et al., 2001).

Meanwhile, heterophily refers to the tendency of individuals to associate with those who are dissimilar, based on individual characteristics or group membership (Boutyline & Willer, 2016; Halberstam & Knight, 2016; McPherson et al., 2001). This concept is often discussed regarding whether interactions with different individuals within the network will reinforce existing consistencies or lead to more accurate perceptions through mutual understanding (e.g., Song et al.,

2020). Communication with heterogeneous individuals does not always reduce the consistency of beliefs; at least, such reduction may lead to a decrease in partisan attitudes and, further, a decrease in actual participation in the context of mobilization theory. However, to the best of our knowledge, there is a lack of prior research on the types of networks formed by individuals on social media platforms and their potential impact on facilitating OPP.

In terms of the role of networks, the impact of heterophily, and by extension homophily, on political participation, including OPP, remains inconclusive according to Valenzuela et al. (2012). Some research has found that high levels of heterophily can lead to political ambivalence and fear of isolation, resulting in decreased participation (e.g., Chu & Yeo, 2020; Mutz, 2006), while other studies have indicated that heterophily is positively related to participation (e.g., Scheufele et al., 2006; Strauß et al., 2020). Therefore, it can be hypothesized that the formation of networks characterized by homophily through SMU may enhance OPP, whereas the absence of such networks may decrease OPP. Furthermore, if the remaining variation is insignificant, then this supports the normalization hypothesis.

Regarding the nature of social interactions on social media, particularly among mobilized users, and whether these interactions exhibit homophily (engagement with like-minded groups) or heterophily (engagement with a diverse range of opinions), (Fig. 1) the study proposes the following second hypothesis:

- Hypothesis 2: Social media networks formed on the basis of homophily foster OPP.

Combining the above theories and approaches, factors influencing online participation predominantly focus on the demographic characteristics of individuals (Boulianne, 2018), such as gender, age, education level, income level, regional affiliation, marital status, occupation, and religion (e.g., Anduiza et al., 2010; Best & Krueger, 2005; Dutton & Blank, 2011; Park, 2018; Saglie & Vabo, 2009; Shin et al., 2017; Smith, 2013; Vicente & Novo, 2014). Recent research has also directed attention to situational factors affecting online participation. Among these noteworthy research areas is privacy-related research (Hoffmann & Lutz, 2023; Lutz & Hoffmann, 2019).

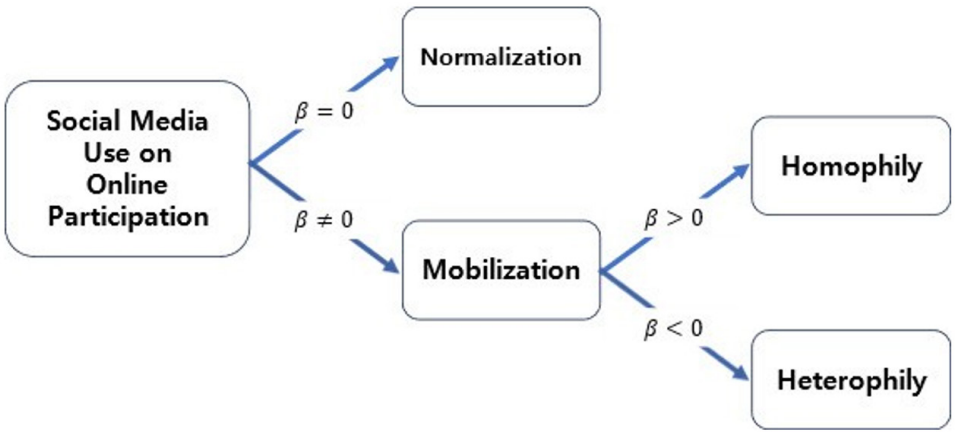

Fig. 1. Summary of hypothesis.

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Privacy concerns have sparked debates on whether they prompt individuals to engage in more active online activities, including online participation, or conversely, deter them, turning them into passive consumers. This phenomenon is sometimes referred to as the 'privacy paradox' (Blank, 2013; Hoffmann & Lutz, 2023). In particular, where concerns about privacy invasion are high, there is a possibility of negative effects on online participation (Jang & Sung, 2021). Furthermore, overall privacy concerns associated with the online platform itself may lead individuals not only to refrain from participating but also to avoid using the platform altogether.

Variables, Measurement, and Data

This study utilizes data from the Korea Media Panel Survey (KMPS), which is published annually by the Korea Information Society Development Institute (KISDI).[2] The dependent variable in this study is OPP. The first survey on OPP in the KMPS was conducted in 2012. Although there are concerns about the measurement of OPP due to its broad definition, a series of empirical studies (Jang, 2021; Oser et al., 2013; Park, 2018; Shin et al., 2017; Vicente & Novo, 2014) have used the frequency of key behaviors within OPP as dependent variables. These behaviors include 'expressing opinions on public issues online (commenting, posting on forums, participating in discussions)' and 'participating in online voting, signing petitions, or opinion polls.' Specific survey items[3] include 'frequency of writing original comments and replies on internet news/discussion boards over the past three months,' 'frequency of scrapping posts on internet news/discussion boards over the past three months,' 'frequency of online voting in the past three months,' and 'frequency of recommending and rating posts online over the past three months.' The items are measured on a 6-point scale, ranging from ① rarely; ② about once every three months; ③ 1–3 times per month; ④ 1–3 times per week; ⑤ 4–6 times per week; to ⑥ almost every day. Following previous research using KMPS, we decided to use the average value of these four items.

The independent variable in this study is SMU. Despite concerns about measurement similar to those with OPP, the existing literature has predominantly used frequency variables to measure SMU (Hargittai & Hsieh, 2010; Jin & Yang, 2015; Kim & Ellison, 2022). Survey items for the independent variable include 'frequency of writing posts and replies on social media in the past three months,' 'frequency of information sharing activities on social media in the past three months,' and 'frequency of recommending and rating posts on social media in the past three months.' These are measured on a 6-point scale: ① almost never; ② about once every three months; ③ about 1–3 times per month;

[2] The survey uses the apartment and general survey districts from the 2005 Population and Housing Census as its sampling frames. The original panel's sample comprises 56 layers, resulting from a compromise between a proportional allocation method and a method that uses the average results of the sampling distribution by square root distribution. The South Korean metropolitan cities and provinces are divided into 16 regions for stratification, and these 16 regions are further stratified into 28 layers based on administrative units (i.e., Eup, Myeon, and Dong). Each of these 28 layers is then subdivided into two layers based on the ratio of apartment households in Dongs and the ratio of farm and fishery households in Eups and Myeons. For the sampling process, a stratified two-stage sampling method is applied. This involves assigning 500 district units for the primary sampling and then selecting household and individual units for the secondary sampling.

[3] In this study, we decided to exclude four out of 14 questions that inquire about activities in internet communities/cafes/clubs, as these activities are specific to certain locations, which could potentially affect the rigor of our analysis. Additionally, we excluded three questions related to activities through social networking sites (SNS), as they were difficult to distinguish qualitatively from our independent variable, the frequency of social media use. This exclusion was necessary to avoid potential endogeneity or issues with tautology.

④ about 1–3 times per week; ⑤ about 4–6 times per week; and ⑥ almost every day. We use the average value of these three items as the SMU variable. All other variables in the study are control variables, one of which is privacy concerns.

Table 1 presents the Cronbach's Alpha values for various items related to OPP, SMU, and privacy concerns. These values indicate internal consistency reliability, which measures the homogeneity of the items within a scale. Typically, a value of 0.7 or higher is considered acceptable, 0.8 or higher is desirable, and values above 0.9 are viewed as excellent, despite some criticisms (see DeVellis, 2016; Taber, 2018). Each variable's category demonstrates a degree of internal consistency that aligns with academic standards. Although detailed yearly results are omitted due to space constraints, it is noteworthy that these values have remained robust over time (OPP: 0.8367–0.8797, SMU: 0.934–0.950, privacy concerns: 0.955–0.985). In addition, income level, age group, educational background, religious affiliation, and employment status are also used to control for time-varying variations.

The instrumental variable used in this study is telecommunication costs (Z_{it}): measured as the average monthly expense over the past three months, excluding the content bill, mobile payment bill, and monthly device installment. Concerning the use of telecommunication costs as an instrumental variable, it is crucial to consider their ability to control simultaneity when instrumental variables are derived from the same cross-sectional data (Angrist & Pischke, 2008). Instruments measured contemporaneously are limited in controlling for reverse causality. However, it is worth

Table 1. Cronbach alpha (overall)

Variable	Items	Item-test correlation	Item-rest correlation	Cronbach alpha	Overall
Online political participation	Frequency of writing original comments and replies on internet news/discussion boards over the past three months.	0.8423	0.7056	0.826	0.8622
	Frequency of scrapping posts on internet news/discussion boards over the past three months.	0.8399	0.7196	0.8213	
	Frequency of online voting in the past three months.	0.8524	0.7310	0.8155	
	Frequency of recommending and rating posts online over the past three months.	0.8337	0.6864	0.8347	
Social media use	Frequency of writing posts and replies on social media in the past three months.	0.9393	0.8598	0.9077	0.9418
	Frequency of information sharing activities on social media in the past three months.	0.9510	0.8888	0.8845	
	Frequency of recommending and rating posts on social media in the past three months.	0.9297	0.8436	0.9199	
Private concerns	I am worried that people I do not know can see my online activities and obtain my personal information.	0.9284	0.8970	0.9592	0.9799
	I am worried that my personal information can remain on my old devices.	0.9128	0.8729	0.9617	
	I am worried that, when I sign up for an online site, it asks for too much personal information.	0.9277	0.8937	0.9595	
	I am worried that my online ID can be stolen.	0.9288	0.8957	0.9593	
	I am generally concerned about my privacy when using the internet.	0.9429	0.9168	0.9571	
	I am suspicious of people who do not reveal their identities online.	0.9105	0.8705	0.9619	
	I am worried that people I do not know can see my online activities and obtain my personal information.	0.9284	0.8970	0.9592	

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noting that the telecommunication costs variable results from a multi-year contract made in the past.

In South Korea, the structure of mobile device purchase agreements—often mandating a two-to-three-year contract for a subsidy on the device and communication costs—creates a scenario where telecommunication costs can act as a predeterminant variable suitable for controlling simultaneity in this study. Despite the enactment of the Mobile Device Distribution Improvement Act, aimed at regulating subsidy anomalies, fluctuations in these subsidies remain significant (Kim et al., 2017). Occasionally, these fluctuations allow consumers to acquire high-end devices like the latest iPhone for free. This randomness in subsidy amounts introduces variability in telecommunication costs, independent of factors that induce OPP, making telecommunication costs a viable instrument for analysis.

Analysis Methods: FE2SLS

Any effect of SMU might be the result of endogenous problems, especially reverse causality. For example, individuals who are active in OPP may also actively use social media. One way to address this endogeneity problem is to use actionable instrumental variables for SMU in empirical estimation. We employ the Fixed Effect Two-Stage Least Squares (FE2SLS) estimator (Schaffer, 2020), using the telecommunication costs variable as the instrumental variable. This approach is used to estimate the effect of SMU while controlling for unobserved factors and addressing reverse causality (Milner et al., 2018). The formula is as follows.

$$\mathrm{y} = \beta_0 + \beta_1 \mathrm{SMU} + \beta_2 \mathrm{X} + \beta_3 \ \mathrm{Time}_{\ \mathrm{t}} + \alpha_{\mathrm{i}} + \mathrm{u}\,,\ \mathrm{t} = 1, \ldots, 6 \tag{1}$$

$$\widetilde{y_i} = \beta_1 \widetilde{\widehat{SMU}_i} + \beta_2 \widetilde{X} + \beta_3 \widetilde{Time} + u_i,\ \widetilde{y}_i = y = \overline{y_i} :\ \text{2nd Stage} \tag{2}$$

$$\widetilde{SMU_i} = \gamma_1 \widetilde{Z}_1 + \gamma_2 \widetilde{X}_i + \gamma_3\ \widetilde{Time_i} + \tilde{\varepsilon}_i :\ \text{1st stage} \tag{3}$$

The first stage involves a fixed effect model where first-order difference operations are performed. In this model, SMU_i represents the difference in individual i's level of SMU between period t and period t+1, while $Z(Phonebill)i_t$ represents the difference in telecommunication cost. X_{it} is the vector of control variables, and e_{it} is the error term. The aim of the first stage is to isolate exogenous factors that cause changes in SMU, excluding unobserved confounders. Using the predicted value of SMU obtained from the first regression, we estimate the effect of SMU on OPP (Y_{it}) in the second stage. Furthermore, to ensure the appropriate use of the instrumental variable, we examined its suitability by sequentially verifying the exogeneity assumption of the explanatory variables and the relevance of the instrumental variable, as is commonly done in such analyses (Wooldridge, 2010).

Empirical Results

Descriptive statistics

Since this study employs a fixed-effects model that controls for individual time-invariant

characteristics, our interpretation of the descriptive statistics focuses on the important time-varying variables (Table 2, 3, 4). Both OPP and SMU incrementally increased during the analysis period. However, the average of the OPP measurements is close to 1, and the distribution of OPP shows positive skewness. This suggests that most people do not engage in political activities online, and only a small number are highly active. Similarly, the sub-measurement variable of SMU, akin to that of OPP, indicates that SMU is not significantly high either. On the other hand, privacy concerns, a control variable, did not change significantly until 2017 but then rapidly increased by more than 1 point on average in that year, with an average of 3–4 points, indicating high levels of privacy concerns. Finally, telecommunication costs, the instrumental variable, is measured on a scale of 1 to 11 points. The average telecommunication costs did not change significantly during the analysis period, showing a slight overall decline.

However, when we decompose the variation, it reveals dynamics that were challenging to

Table 2. Descriptive statistics (group)

Variables		Mean	Std. dev	Min	Max	Observations	
OPP	Overall	1.110	0.410	1	6	N	49,953
	Between		0.275	1	5.25	n	9,652
	Within		0.322	−1.307	5.276	$\bar{T}$	5.175
Social media use	Overall	1.495	1.105	1	6	N	49,953
	Between		0.779	1	6	n	9,652
	Within		0.801	−2.505	5.661	$\bar{T}$	5.175
Telecommunication cost	Overall	5.031	1.921	1	11	N	46,658
	Between		1.621	1	11	n	9,282
	Within		1.119	−0.802	12.198	$\bar{T}$	5.027
Privacy concern	Overall	3.651	1.648	1	8	N	49,953
	Between		0.882	1	8	n	9,652
	Within		1.429	−2.182	9.401	$\bar{T}$	5.175
Income level	Overall	2.974	2.031	1	8	N	49,953
	Between		1.901	1	8	n	9,652
	Within		0.752	−2.693	8.807	$\bar{T}$	5.175
Age group	Overall	5.113	2.017	1	8	N	49,953
	Between		2.055	1	8	n	9,652
	Within		0.289	4.280	5.946	$\bar{T}$	5.175
Education level	Overall	3.801	1.144	1	6	N	49,953
	Between		1.142	1	6	n	9,652
	Within		0.210	1.301	5.634	$\bar{T}$	5.175
Marriage status (1=married)	Overall	0.304	0.460	0	1	N	49,953
	Between		0.468	0	1	n	9,652
	Within		0.065	−0.529	1.138	$\bar{T}$	5.175
Religious affilication (1=yes)	Overall	0.307	0.461	0	1	N	49,953
	Between		0.339	0	1	n	9,652
	Within		0.318	−0.526	1.141	$\bar{T}$	5.175
Employment status (1=hired)	Overall	0.512	0.500	0	1	N	49,953
	Between		0.461	0	1	n	9,652
	Within		0.201	−0.321	1.345	$\bar{T}$	5.175

OPP, online political participation.

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Table 3. Descriptive statistics (year)

Type	Variable name	Year	N	Mean	SD	Min	Max
Dependent variable	Online political participation (OPP)	2014	8,182	1.087	0.354	1	6
		2015	8,199	1.118	0.441		
		2016	8,416	1.105	0.384		
		2017	8,267	1.122	0.441		
		2018	8,461	1.119	0.429		
		2019	8,428	1.106	0.401		
Independent variable	Social media use (SMU)	2014	8,182	1.322	0.892	1	6
		2015	8,199	1.423	1.029		
		2016	8,416	1.471	1.100		
		2017	8,267	1.484	1.082		
		2018	8,461	1.619	1.223		
		2019	8,428	1.640	1.224		
Instrumental variable	Telecommunication costs (IV)	2014	7,392	5.179	2.042	1	11
		2015	7,524	5.188	2.044		
		2016	7,812	5.020	1.886		
		2017	7,792	5.051	1.888		
		2018	8,060	4.914	1.847		
		2019	8,078	4.859	1.804		
Control variable	Privacy concern	2014	8,182	3.132	1.184	1	8
		2015	8,199	3.013	1.116		
		2016	8,416	3.150	1.112		
		2017	8,267	4.271	1.898		
		2018	8,461	4.016	1.833		
		2019	8,428	4.304	1.879		

Table 4. Correlation table

	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]
[1] Online participation	1									
[2] Social media use	0.373***	1								
[3] Telecomm costs	0.137***	0.154***	1							
[4] Private concern	0.009**	–0.017***	–0.055***	1						
[5] Income level	0.057***	0.001	0.340***	0.013***	1					
[6] Age group	–0.146***	–0.301***	–0.256***	0.106***	0.169***	1				
[7] Education level	0.185***	0.257***	0.522***	–0.029***	0.392***	–0.278***	1			
[8] Marriage status	0.061***	0.159***	–0.021***	–0.019***	–0.247***	–0.458***	–0.108***	1		
[9] Religious affiliation	0.031***	–0.015***	0.278***	–0.014***	0.809***	0.202***	0.282***	–0.237***	1	
[10] Employment status	0.037***	0.002***	–0.107***	0.031***	–0.017***	0.105***	–0.041***	–0.054***	–0.015***	1

*p<0.1, **p<0.05, ***p<0.01; Depending on the variable type, pearson correlation, point biserial correlation, fourfold point correlation are used, respectively.

discern through simple trend analysis. Firstly, the within-variation for OPP is more significant than the between-variation. This suggests that there is more variability in OPP within the same individuals over time than across different individuals. Consequently, our analysis focuses on within-variation in OPP, which is why we test the mobilization hypothesis. Secondly, within-variations are larger than between-variations in SMU. This indicates that the variation is more

influenced by changes within the same individuals over time. Thirdly, the between-variation in telecommunication cost is significantly higher than the within-variation. Among the time-varying variables, the telecommunication cost variable is the only one with higher between-variation than within-variation. This can be attributed to the randomness in subsidies. Lastly, within-variation is considerably higher than between-variation in the case of privacy concerns. This suggests that an individual's level of concern about privacy is subject to more significant changes over time than the differences in privacy concerns among different individuals.

Model specification and identification

Using a fixed-effect model is preferable when there are not many observable variables available, and the risk of omitted variable bias is high. However, it is insufficient to handle all endogeneity issues, especially the problem of reverse causality (Schaffer, 2020; Wooldridge, 2010). If a reverse causal relationship exists between SMU and OPP, the effect of the independent variable can be underestimated when the instrumental variable is not used (e.g., Cawley & Meyerhoefer, 2012; Kwon, 2016). To address the remaining problem, we conduct FE2SLS (Model 1) alongside FE (Model 3), as well as RE2SLS (Model 2) and RE (Model 4) for efficient estimations additionally.

In the following, we examine whether the telecommunication costs variable is appropriate as the instrumental variable. Instrumental variables must meet the criteria of exogeneity, relevance, exclusivity, and identifiability. However, as the exogeneity of instrumental variables is challenging to identify statistically, the necessity of instrumental variables can only be confirmed by examining the endogeneity of explanatory variables (Schaffer, 2020; Wooldridge, 2010). The problem of endogeneity of explanatory variables relates to the correlation between the variation of the explanatory variables and the residual variation. The endogeneity of explanatory variables can be confirmed by calculating the F-statistic in multiple regression analysis, where the residual of the first-order regression equation is added as a variable to the second-order regression equation. In other words, the null hypothesis $COV\left(\overline{SMU_i}, \overline{u_i}\right) \neq 0$ (Wooldridge, 2010). The analysis results reveal that the F-value, with degrees of freedom 1 and 9282, is 32.29, leading to the rejection of the null hypothesis that SMU has no endogeneity ($p<0.0001$)(Table 5).

Next, we examine the relevance of the instrumental variable. Assessing the relevance of an instrumental variable involves determining whether there is a correlation between the instrumental variable and the explanatory variable that has been identified as endogenous. In other words, the null hypothesis is $COV\left(\overline{SMU_i}, \overline{Phonebill_i}\right) \neq 0$ (Wooldridge, 2010). If the partial F-statistic value of the first-stage regression equation exceeds 10, then the instrumental variable is considered strong (Stock & Yogo, 2005). The analysis results reveal a t-value of 5.68 and a partial F-value of 32.31, indicating that the relevance condition is satisfied. Therefore, the instrumental variable in this study is not weak.[4]

[4] In the Weak Identification Test, the Cragg-Donald Wald F statistic is 40.61, and the Kleibergen-Paap Wald rk F statistic is 32.29. When compared to the Stock-Yogo critical values for a single endogenous regressor, the Cragg-Donald statistic exceeds the 10% maximal IV size critical value of 16.38, suggesting that the instruments are not weak. However, the Kleibergen-Paap Wald rk F statistic also exceeds the 10% threshold (16.38). In the Weak-Instrument-Robust Inference tests, the Anderson-Rubin Wald tests yield an F (1, 9282) statistic of 38.10 and a Chi-squared statistic of 38.11, both with p-values of 0.0000. Additionally, the Stock-Wright LM S statistic is 38.92 with a p-value of 0.0000. These outcomes robustly reject the null hypothesis that the endogenous regressors are jointly insignificant and confirm the validity of the orthogonality conditions.

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Table 5. FE–IV model (1st stage)

Variable	Coefficient	Robust SE	t-value	p>|t|
Telecomm costs (IV)	0.024	0.004	5.680	0.000
Privacy concerns	–0.014	0.002	–6.430	0.000
Income level	0.007	0.007	1.040	0.300
Age group	0.034	0.018	1.870	0.062
Education level	0.415	0.031	13.370	0.000
Marriage status (1=married)	0.013	0.080	0.170	0.865
Religious affiliation (1=yes)	0.099	0.014	7.110	0.000
Employment status (1=hired)	0.025	0.024	1.070	0.283
Year 2014	–0.259	0.018	–14.480	0.000
Year 2015	–0.168	0.017	–9.950	0.000
Year 2016	–0.125	0.016	–7.740	0.000
Year 2017	–0.128	0.015	–8.340	0.000
Year 2018	–0.005	0.015	–0.320	0.747
Fixed effects estimation information				
Number of Groups=9,282	Obs per group: min=2			
Number of Obs=46,658	Avg=5.3			
Number of Clusters (pid)=9,282	Max=6			
Variable	Endogeniety	Underidentification	Weak IV	
Social media use	F (1, 9282)	SW χ^2 (1)	SW F (1, 9282)	
	32.29***	32.31***	32.29***	

Additionally, we test for underidentification of the simultaneous equations model. The analysis results show that the Kleibergen-Paap rk LM statistic, which follows a chi-square distribution with 1 degree of freedom, is 32.29. Consequently, the null hypothesis is rejected, confirming satisfaction of the ranking condition and indicating that there are no issues with the identification of the model. In summary, the instrumental variable is appropriately identified, and there are no concerns related to a weak instrumental variable. Therefore, we can confidently assert that the specification of the FE2SLS model is free from major concerns.

Result of the analysis

The analysis results indicate that there is a significant difference between the model using the instrumental variable and the model without the instrumental variable. Furthermore, the effect of SMU on OPP is underestimated in the models that exclude instrumental variables, consistent with previous findings. The Hausman test results show that the random effects model is not suitable because the null hypothesis is rejected in both cases, whether the instrumental variable is used or not. Therefore, we select Model 1 as the final model.

According to Model 1, a higher level of SMU is associated with a higher level of OPP. In other words, if the level of SMU increases by one unit between different time points within an individual, OPP increases by approximately 0.48. However, since this result is based on estimations using within variations, it cannot be interpreted as implying that individuals with high levels of SMU have higher OPP than those with low levels of SMU. This result suggests that the mobilization hypothesis is likely to be more acceptable than the normalization hypothesis and that the network features

enough homophily to facilitate user participation (Table 6).

The result indicating that SMU has a significantly positive impact on OPP can be understood as an increase in opportunities for OPP resulting from SMU (Shirky, 2011). This is primarily because participation opportunities, such as online surveys, are often promoted on the same platform or across easily accessible platforms. Furthermore, the frequent and intensive interactions and exchanges of opinions among individuals through SMU may have inspired them to participate (Shirky, 2013).

Table 6. Comparison of models

Variable	Model 1 (FE IV)	Model 2 (RE IV)	Model3 (FE)	Model 4 (RE)
Social media use	0.476*** (0.093)	0.539*** (0.087)	0.117*** (0.005)	0.122*** (0.004)
Privacy concerns	0.007*** (0.002)	0.01*** (0.002)	0.001* (0.001)	0.005*** (0.001)
Income level	–0.001 (0.004)	0.012*** (0.003)	0.001 (0.003)	0.007*** (0.002)
Age group	–0.007 (0.01)	0.032*** (0.007)	0.005 (0.007)	0.004* (0.002)
Education level	–0.128*** (0.042)	–0.052*** (0.019)	0.021* (0.011)	0.028*** (0.003)
Marriage status (1=married)	0.01 (0.04)	–0.126*** (0.038)	0.015 (0.03)	0.047*** (0.01)
Religious affiliation (1=yes)	0.011 (0.012)	0.004* (0.011)	0.047*** (0.006)	0.045*** (0.005)
Employment status (1=hired)	–0.026** (0.013)	–0.022** (0.01)	–0.017* (0.01)	–0.014** (0.006)
Year 2014	0.118*** (0.025)	0.173*** (0.031)	0.026*** (0.007)	0.032*** (0.006)
Year 2015	0.106*** (0.018)	0.148*** (0.022)	0.045*** (0.007)	0.05*** (0.006)
Year 2016	0.071*** (0.014)	0.104*** (0.018)	0.026*** (0.006)	0.03*** (0.006)
Year 2017	0.086*** (0.014)	0.107*** (0.017)	0.04*** (0.006)	0.04*** (0.006)
Year 2018	0.019** (0.008)	0.029*** (0.009)	0.017*** (0.006)	0.019*** (0.006)
Telecommunication costs (IV)	NA	NA	0.009*** (0.002)	0.01*** (0.001)
Model specification information				
NOBS	46,658	46,658	46,658	46,658
CLUSTER (pid)	9,282	9,282	9,282	9,282
Model fit	X^2 (13)=761.49***	X^2 (13)=753.59***	F (14, 9281)= 54.27***	X^2 (14)=1,717.90***
Hausman test	X^2 (13)=198.73***		X^2 (14)=329.85***	
σ_u	0.377	0.329	0.248	0.168
σ_e	0.480	0.480	0.355	0.355
ρ	0.382	0.319	0.329	0.184

*p<0.1, **p<0.05 , ***p<0.01; The values within parentheses represent robust clustered standard error estimates.
NA: not applicable

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Discussion

The ongoing debates regarding the utility of SMU are emblematic of broader discussions about whether technological advancements reflect existing societal states or catalyze change. This study contributes to this discourse by examining the effect of SMU in shaping OPP. Our finding aligns with prior research suggesting that SMU can act as a facilitator for civic engagement and participatory behaviors (Bennett & Segerberg, 2012; Theocharis & van Deth, 2017). This observation lends empirical support to the mobilization hypothesis and challenges the belief that technological advances in communication simply mirror existing participatory patterns (Norris, 2001).

Our finding warns of the risk of underestimation by unobserved time-varying factors. The effect size of SMU on OPP is significantly larger in the case of using the instrumental variable than not using it. This can be interpreted as the reverse causality problem severely exists (Kwon, 2016). Research supporting the normalization hypothesis in the context of SMU should be carefully interpreted. However, this study investigates the within variation, thereby, it is crucial to note that the normalization hypothesis is not entirely refuted. There is still a need to further explore the characteristics of groups that exhibit lower levels of OPP. Investigating which groups are underrepresented is vital for understanding the dynamics of representative democracy in the digital age (Park, 2018). The proportion of online participants is only 5%–6% in this dataset, even assuming an ideal sampling, it is difficult to argue that the online participants are highly representative of the entire population. Before considering whether it is necessary to promote SMU to facilitate OPP, thereby, it is necessary to continue the discussion on possible measures to promote the representativeness of the participants.

This study suggests that SMU can promote OPP, as seen in homophily networks, which is informed by social network theory. Contrary to concerns that high levels of heterophily can lead to political ambivalence and fear of isolation, resulting in decreased participation (Chu & Yeo, 2020), our findings indicate the opposite. Homophily networks can lead to the formation of echo chambers, where individuals are primarily exposed to information and opinions that reinforce their existing beliefs. This can exacerbate group thinking and confirmation bias, limiting exposure to diverse viewpoints and reducing critical thinking (Janis, 1972; Sunstein, 2001).

In recent years, social media has been identified as a major channel for propagating fake news (Torres et al., 2018). Some studies suggest that false or fake news spreads faster and more widely than genuine or credible news (e.g., Vosoughi et al., 2018). Unlike legacy media, social media does not have a fact-checking process, and most users share information without considering its authenticity and lack the ability to identify fake news. In the context of mobilization theory, misinformation, such as fake news and conspiracy theories, combined with confirmation bias in homophily networks, tends to become a more severe problem, deepening political polarization and increasing the transaction cost of society as a whole (Moravec et al., 2019). However, our finding indirectly represents the average effect of social network use. Therefore, further studies are needed to examine the mechanisms of political behavior in social networks (e.g., Bond & Sweitzer, 2022).

Conclusion

This study directly examines the controversy between mobilization and normalization theory, which has been somewhat overlooked in previous OPP studies. It aims to determine which theory has higher explanatory power and empirical support. Another merit of this study is its rigorous model selection process, which is based on initial analysis findings and strict methodological criteria. Furthermore, this study makes efforts to control various endogenous problems, including omitted variable bias and reverse causality. Lastly, it provides detailed methods for identifying an appropriate instrumental variable, an aspect that has often been overlooked in previous research, along with specific judgment criteria and test results for the instrumental variable's use.

However, this study has some limitations as follows. First, there is a question regarding the validity of the instrument used. This study utilizes telecommunication costs at time 't' rather than 't–1.' While it can be argued that telecommunication costs from one or two years ago, determined by multi-year contracts and past plans, have minimal impact on current SMU, there remains an inherent issue that FE2SLS may not be a valid tool for controlling endogeneity, despite these rationales. Additionally, there is a fundamental limitation in making causal claims using observational data, raising methodological concerns. Second, there is a concern about whether the measurement of online participation is appropriate. According to the literature (e.g., Hrastinski, 2009; Kim & Hoewe, 2020; Norris, 2002), online participation is a broad concept encompassing various behaviors unrelated to elections or voting, such as discussions, article writing, and replies to articles. While this study measures OPP with multiple items consistent with previous research and demonstrates internal validity, the measurement may lack intuitive clarity and could have potential content validity issues to some extent. Given the constraints of using secondary data, these limitations may be challenging to overcome. Future research should address these limitations through more rigorous measurements and experimental designs.

References

Aichholzer, G., & Rose, G. (2020). Experience with digital tools in different types of e-participation. In L. Hennen, I. van Keulen, I. Korthagen, G. Aichholzer, R. Lindner, & R. Ø. Nielsen (Eds.), *European e-democracy in practice* (pp. 93-140). Springer.

Anduiza, E., Gallego, A., & Cantijoch, M. (2010). Online political participation in Spain: The impact of traditional and Internet resources. *Journal of Information Technology & Politics*, *7*(4), 356-368. https://doi.org/10.1080/19331681003791891

Angrist, J., & Pischke, J. S. (2008). Parallel worlds: Fixed effects, differences-in-differences and panel data. In T. Sullivan & S. Ditchik (Eds.), *Mostly harmless econometrics: An empiricist's companion* (pp. 165-184). Princeton University Press.

Ashley, S., Maksl, A., & Craft, S. (2017). News media literacy and political engagement: What's the connection? *Journal of Media Literacy Education*, *9*(1), 79-98. https://doi.org/10.23860/JMLE-2017-9-1-6

Barrett, M., & Brunton-Smith, I. (2017). Political and civic engagement and participation: Towards

https://doi.org/10.52372/jps.39401

an integrative perspective. In C. Bee & R. Guerrina (Eds.), *Framing civic engagement, political participation and active citizenship in Europe* (pp. 5-28). Routledge.

Bennett, W. L., & Pfetsch, B. (2018). Rethinking political communication in a time of disrupted public spheres. *Journal of Communication*, *68*(2), 243-253. https://doi.org/10.1093/joc/jqx017

Bennett, W. L., & Segerberg, A. (2012). The logic of connective action: Digital media and the personalization of contentious politics. *Information, Communication & Society*, *15*(5), 739-768. https://doi.org/10.1080/1369118X.2012.670661

Best, S. J., & Krueger, B. S. (2005). Analyzing the representativeness of Internet political participation. *Political Behavior*, *27*(2), 183-216. https://doi.org/10.1007/s11109-005-3242-y

Blank, G. (2013). Who creates content? Stratification and content creation on the Internet. *Information, Communication & Society*, *16*(4), 590-612. https://doi.org/10.1080/1369118X.2013.777758

Bond, R. M., & Sweitzer, M. D. (2022). Political homophily in a large-scale online communication network. *Communication Research*, *49*(1), 93-115. https://doi.org/10.1177/0093650218813655

Bonfadelli, H. (2002). The Internet and knowledge gaps: A theoretical and empirical investigation. *European Journal of Communication*, *17*(1), 65-84. https://doi.org/10.1177/0267323102017001607

Boulianne, S. (2018). Twenty years of digital media effects on civic and political participation. *Communication Research*, *47*(7), 947-966. https://doi.org/10.1177/0093650218808186

Boutyline, A., & Willer, R. (2016). The social structure of political echo chambers: Variation in ideological homophily in online networks. *Political Psychology*, *38*(3), 551-569. https://doi.org/10.1111/pops.12337

Büchi, M., & Vogler, F. (2017). Testing a digital inequality model for online political participation. *Socius: Sociological Research for a Dynamic World*, *3*, 1-13. https://doi.org/10.1177/2378023117733903

Castells, M. (2008). The new public sphere: Global civil society, communication networks, and global governance. *The Annals of the American Academy of Political and Social Science*, *616*(1), 78-93. https://doi.org/10.1177/0002716207311877

Cawley, J., & Meyerhoefer, C. (2012). The medical care costs of obesity: An instrumental variables approach. *Journal of Health Economics*, *31*(1), 219-230. https://doi.org/10.1016/j.jhealeco.2011.10.003

Chadwick, A. (2006). *Internet politics: States, citizens and new communication technologies*. Oxford University Press.

Christakis, N. A., & Fowler, J. H. (2009). *Connected: The surprising power of our social networks and how they shape our lives*. Little, Brown.

Chu, T. H., & Yeo, T. E. D. (2020). Rethinking mediated political engagement: Social media ambivalence and disconnective practices of politically active youths in Hong Kong. *Chinese Journal of Communication*, *13*(2), 148-164. https://doi.org/10.1080/17544750.2019.1634606

Dahlberg, L., & Siapera, E. (2007). *Radical democracy and the Internet: Interrogating theory and practice*. Springer.

Dahlgren, P. (2005). The Internet, public spheres, and political communication: Dispersion and deliberation. *Political Communication*, *22*(2), 147-162. https://doi.org/10.1080/10584600590933160

Dalton, R. J. (2017). *The participation gap: Social status and political inequality*. Oxford University Press.

DeVellis, R. F. (2016). *Scale development: Theory and applications*. Sage publications.

di Gennaro, C., & Dutton, W. (2006). The Internet and the public: Online and offline political participation in the United Kingdom. *Parliamentary Affairs*, *59*(2), 299-313. https://doi.org/10.1093/pa/gsl004

Dutton, W. H., & Blank, G. (2011). Next generation users: The Internet in Britain. *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1960655

Feezell, J. T., Conroy, M., & Guerrero, M. (2016). Internet use and political participation: Engaging citizenship norms through online activities. *Journal of Information Technology & Politics*, *13*(2), 95-107. https://doi.org/10.1080/19331681.2016.1166994

George, J. J., & Leidner, D. E. (2019). From clicktivism to hacktivism: Understanding digital activism. *Information and Organization*, *29*(3), 100249. https://doi.org/10.1016/j.infoandorg.2019.04.001

Gerl, K., Marschall, S., & Wilker, N. (2018). Does the Internet encourage political participation? Use of an online platform by members of a German political party. *Policy & Internet*, *10*(1), 87-118. https://doi.org/10.1002/poi3.149

Granovetter, M. (1983). The strength of weak ties: A network theory revisited. *Sociological Theory*, *1*, 201-233. https://doi.org/10.2307/202051

Guess, A. M., & Munger, K. (2023). Digital literacy and online political behavior. *Political Science Research and Methods*, *11*(1), 110-128. https://doi.org/10.1017/psrm.2022.17

Halberstam, Y., & Knight, B. (2016). Homophily, group size, and the diffusion of political information in social networks: Evidence from Twitter. *Journal of Public Economics*, *143*, 73-88. https://doi.org/10.1016/j.jpubeco.2016.08.011

Hargittai, E., & Hsieh, Y. P. (2010). Predictors and consequences of differentiated practices on social network sites. *Information, Communication & Society*, *13*(4), 515-536. https://doi.org/10.1080/13691181003639866

Hirzalla, F., van Zoonen, L., & de Ridder, J. (2011). Internet use and political participation: Reflections on the mobilization/normalization controversy. *The Information Society*, *27*(1), 1-15. https://doi.org/10.1080/01972243.2011.534360

Hoffman, L. H. (2012). Participation or communication? An explication of political activity in the Internet age. *Journal of Information Technology & Politics*, *9*(3), 217-233. https://doi.org/10.1080/19331681.2011.650929

Hoffmann, C. P., & Lutz, C. (2023). The contextual role of privacy concerns in online political participation. *European Journal of Communication*, *38*(4), 363-379. https://doi.org/10.1177/02673231221139040

Hrastinski, S. (2009). A theory of online learning as online participation. *Computers & Education*, *52*(1), 78-82. https://doi.org/10.1016/j.compedu.2008.06.009

Jang, C. K. (2021). The effect of digital literacy on online social participation of mobile device users: Focusing on the moderating effect of generation effect. *Journal of Cybercommunication Academic Society*, *38*(4), 77-113. https://doi.org/10.36494/jcas.2021.12.38.4.77

Jang, C., & Sung, W. (2021). Beyond the privacy paradox: The moderating effect of online privacy concerns on online service use behavior. *Telematics and Informatics*, *65*, 101715. https://doi.org/10.1016/j.tele.2021.101715

https://doi.org/10.52372/jps.39401

Janis, I. L. (1972). *Victims of Groupthink: A psychological study of foreign-policy decisions and fiascoes*. Houghton Mifflin.

Jin, B., & Yang, J. (2015). Exploring the types of SNS use based on personality traits, offline activities, political orientations, and life satisfaction. *Korean Journal of Journalism & Communication Studies*, *59*(5), 239-271.

Jost, J. T., Barberá, P., Bonneau, R., Langer, M., Metzger, M., Nagler, J., Sterling, J., & Tucker, J. A. (2018). How social media facilitates political protest: Information, motivation, and social networks. *Political Psychology*, *39*(S1), 85-118. https://doi.org/10.1111/pops.12478

Kann, M. E., Berry, J., Grant, C., & Zager, P. (2007). The Internet and youth political participation. *First Monday*, *12*(8). https://doi.org/10.5210/fm.v12i8.1977

Kim, E. (2015). A comparative study on social media use and public participation in Korea and the United States: Does social media matter? *Journal of Policy Studies*, *30*(1), 207-230. https://doi.org/10.52372/kjps30108

Kim, B., & Hoewe, J. (2020). Developing contemporary factors of political participation. *The Social Science Journal*, *60*(4), 862-876. https://doi.org/10.1080/03623319.2020.1782641

Kim, D. H., & Ellison, N. B. (2022). From observation on social media to offline political participation: The social media affordances approach. *New Media & Society*, *24*(12), 2614-2634. https://doi.org/10.1177/1461444821998346

Kim, Y., & Chen, H. T. (2016). Social media and online political participation: The mediating role of exposure to cross-cutting and like-minded perspectives. *Telematics and Informatics*, *33*(2), 320-330. https://doi.org/10.1016/j.tele.2015.08.008

Kim, J., Park, S., Cho, H., Kim, J., & Choi, J. Y. (2017). Public trust in a mobile device and service policy in South Korea: The mobile device distribution improvement act. *Telematics and Informatics*, *34*(2), 540-547. https://doi.org/10.1016/j.tele.2016.08.020

Kitanova, M. (2020). Youth political participation in the EU: Evidence from a cross-national analysis. *Journal of Youth Studies*, *23*(7), 819-836. https://doi.org/10.1080/13676261.2019.1636951

Koc-Michalska, K., & Lilleker, D. (2017). Digital politics: Mobilization, engagement, and participation. *Political Communication*, *34*(1), 1-5. https://doi.org/10.1080/10584609.2016.1243178

Kwon, I. (2016). Closedness of public administration and corruption. *The Korean Governance Review*, *23*(3), 333-352. https://doi.org/10.17089/kgr.2016.23.3.013

Lilleker, D. G., & Koc-Michalska, K. (2018). What drives political participation? Motivations and mobilization in a digital age. In K. Koc-Michalska & D. G. Lilleker (Eds.), *Digital politics: Mobilization, engagement and participation* (pp. 21-43). Routledge.

Lutz, C., & Hoffmann, C. P. (2019). How privacy concerns and social media platform use affect online political participation in Germany. *Proceedings of the Weizenbaum Conference 2019 "Challenges of Digital Inequality - Digital Education, Digital Work, Digital Life"* (pp. 1-9). Berlin, Germany.

Matthews, F. (2021). The value of 'between-election' political participation: Do parliamentary e-petitions matter to political elites? *The British Journal of Politics and International Relations*, *23*(3), 410-429. https://doi.org/10.1177/1369148120959041

Matusitz, J. (2022). Social media paradox theory: Why social media are both enabling and disabling.

In R. Baikady, S. M. Sajid, V. Nadesan, J. Przeperski, M. R. Islam, & J. Gao (Eds.), *The Palgrave handbook of global social change* (pp. 1-17). Springer.

McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual Review of Sociology*, *27*(1), 415-444. https://doi.org/10.1146/annurev.soc.27.1.415

Mejias, U. A. (2010). The limits of networks as models for organizing the social. *New Media & Society*, *12*(4), 603-617. https://doi.org/10.1177/1461444809341392

Milner, A., Aitken, Z., Kavanagh, A., LaMontagne, A. D., Pega, F., & Petrie, D. (2018). Combining fixed effects and instrumental variable approaches for estimating the effect of psychosocial job quality on mental health: Evidence from 13 waves of a nationally representative cohort study. *Journal of Public Health*, *40*(2), 426-434. https://doi.org/10.1093/pubmed/fdx070

Montgomery, K., Gottlieb-Robles, B., & Larson, G. O. (2004). *Youth as e-citizens: Engaging the digital generation*. Center for Social Media at American University.

Moravec, P. L., Minas, R. K., & Dennis, A. R. (2019). Fake news on social media: People believe what they want to believe when it makes no sense at all. *MIS Quarterly*, *43*(4), 1343-1360. https://doi.org/10.25300/MISQ/2019/15505

Mossberger, K., Tolbert, C. J., & Stansbury, M. (2003). *Virtual inequality: Beyond the digital divide*. Georgetown University Press.

Mutz, D. C. (2006). *Hearing the other side: Deliberative versus participatory democracy*. Cambridge University Press.

Norris, P. (2001). *Digital divide: Civic engagement, information poverty, and the Internet worldwide*. Cambridge University Press.

Norris, P. (2002). *Democratic phoenix: Reinventing political activism*. Cambridge University Press.

Oates, S., Owen, D., & Gibson, R. K. (2006). *The Internet and politics: Citizens, voters and activists*. Routledge.

O'Neil, C. (2017). *Weapons of math destruction: How big data increases inequality and threatens democracy*. Crown.

Oser, J., & Boulianne, S. (2020). Reinforcement effects between digital media use and political participation: A meta-analysis of repeated-wave panel data. *Public Opinion Quarterly*, *84*(S1), 355-365. https://doi.org/10.1093/poq/nfaa017

Oser, J., Hooghe, M., & Marien, S. (2013). Is online participation distinct from offline participation? A latent class analysis of participation types and their stratification. *Political Research Quarterly*, *66*(1), 91-101. https://doi.org/10.1177/1065912912436695

Pariser, E. (2011). *The filter bubble: What the Internet is hiding from you*. Penguin.

Park, E. H. (2018). An empirical study on the factors influencing online citizen participation. *Korean Society and Public Administration*, *29*(1), 187-210. https://doi.org/10.53865/kspa.2018.05.29.1.187

Quintelier, E., & Vissers, S. (2008). The effect of Internet use on political participation: An analysis of survey results for 16-year-olds in Belgium. *Social Science Computer Review*, *26*(4), 411-427. https://doi.org/10.1177/0894439307312631

Ruess, C., Hoffmann, C. P., Boulianne, S., & Heger, K. (2021). Online political participation: The evolution of a concept. *Information, Communication & Society*, *26*(8), 1495-1512-. https://doi.org/10.1080/1369118X.2021.2013919

https://doi.org/10.52372/jps.39401

Ruess, C., Hoffmann, C. P., Boulianne, S., & Heger, K. (2023). Online political participation: The evolution of a concept. *Information, Communication & Society*, *26*(8), 1495-1512. https://doi.org/10.1080/1369118x.2021.2013919

Saglie, J., & Vabo, S. I. (2009). Size and e-democracy: Online participation in Norwegian local politics. *Scandinavian Political Studies*, *32*(4), 382-401. https://doi.org/10.1111/j.1467-9477.2009.00235.x

Schaffer, M. (2020). *XTIVREG2: Stata module to perform extended IV/2SLS, GMM and AC/HAC, LIML and k-class regression for panel data models*. IDEAS.

Scheufele, D. A., Hardy, B. W., Brossard, D., Waismel-Manor, I. S., & Nisbet, E. (2006). Democracy based on difference: Examining the links between structural heterogeneity, heterogeneity of discussion networks, and democratic citizenship. *Journal of Communication*, *56*(4), 728-753. https://doi.org/10.1111/j.1460-2466.2006.00317.x

Selwyn, N., Gorard, S., & Furlong, J. (2005). Whose Internet is it anyway?: Exploring adults' (non) use of the Internet in everyday life. *European Journal of Communication*, *20*(1), 5-26. https://doi.org/10.1177/0267323105049631

Shin, S., An, S., & Kim, D. (2017). A study of age effect on online civic participation: Focusing on influence of Internet literacy. *The Korea Association for Policy Studies*, *26*(1), 287-317.

Shirky, C. (2011). The political power of social media: Technology, the public sphere, and political change. *Foreign Affairs*, *90*(1), 28-41.

Shirky, C. (2013). Truth without scarcity, ethics without force. In K. McBride & T. Rosenstiel (Eds.), *The new ethics of journalism: Principles for the 21st century*. Sage.

Smith, A. (2013). Civic engagement in the digital age. *Pew Internet & American Life Project*. http://www.pewinternet.org/2013/04/25/civic-engagement-in-the-digital-age/

Song, H., Cho, J., & Benefield, G. A. (2020). The dynamics of message selection in online political discussion forums: Self-segregation or diverse exposure? *Communication Research*, *47*(1), 125-152. https://doi.org/10.1177/0093650218790144

Stock, J. H., & Yogo, M. (2005). Asymptotic distributions of instrumental variables statistics with many instruments. In D. W. K. Andrews & J. H. Stock (Eds.), *Identification and inference for econometric models: Essays in honor of Thomas Rothenberg* (pp. 109-120). Cambridge University Press.

Strauß, N., Alonso-Muñoz, L., & Gil de Zúñiga, H. (2020). Bursting the filter bubble: The mediating effect of discussion frequency on network heterogeneity. *Online Information Review*, *44*(6), 1161-1181. https://doi.org/10.1108/OIR-11-2019-0345

Sunstein, C. R. (2001). *Republic.com*. Princeton University Press.

Taber, K. S. (2018). The use of Cronbach's alpha when developing and reporting research instruments in science education. *Research in Science Education*, *48*(6), 1273-1296. https://doi.org/10.1007/s11165-016-9602-2

Theocharis, Y., & Lowe, W. (2016). Does Facebook increase political participation? Evidence from a field experiment. *Information, Communication & Society*, *19*(10), 1465-1486. https://doi.org/10.1080/1369118X.2015.1119871

Theocharis, Y., & van Deth, J. W. (2017). *Political participation in a changing world: Conceptual and empirical challenges in the study of citizen engagement*. Routledge. https://doi.org/10.4324/9780203728673

Theocharis, Y., & van Deth, J. W. (2018). The continuous expansion of citizen participation: A new taxonomy. *European Political Science Review*, *10*(1), 139-163. https://doi.org/10.1017/S1755773916000230

Torres, R., Gerhart, N., & Negahban, A. (2018). Epistemology in the era of fake news: An exploration of information verification behaviors among social networking site users. *ACM SIGMIS Database: The DATABASE for Advances in Information Systems*, *49*(3), 78-97. https://doi.org/10.1145/3242734.3242740

Vaccari, C., & Valeriani, A. (2021). *Outside the bubble: Social media and political participation in Western democracies*. Oxford University Press.

Valenzuela, S. (2013). Unpacking the use of social media for protest behavior: The roles of information, opinion expression, and activism. *American Behavioral Scientist*, *57*(7), 920-942. https://doi.org/10.1177/0002764213479375

Valenzuela, S., Kim, Y., & Gil de Zúñiga, H. (2012). Social networks that matter: Exploring the role of political discussion for online political participation. *International Journal of Public Opinion Research*, *24*(2), 163-184. https://doi.org/10.1093/ijpor/edr037

van Dijk, J. (2020). *The digital divide*. John Wiley & Sons.

van Dijk, J. A. G. M. (2005). *The deepening divide: Inequality in the information society*. SAGE Publications.

van Dijk, J. A. G. M. (2006). Digital divide research, achievements and shortcomings. *Poetics*, *34*(4–5), 221-235. https://doi.org/10.1016/j.poetic.2006.05.004

Vasilescu, B., Capiluppi, A., & Serebrenik, A. (2014). Gender, representation and online participation: A quantitative study. *Interacting with Computers*, *26*(5), 488-511. https://doi.org/10.1093/iwc/iwt047

Velasquez, A. (2012). Social media and online political discussion: The effect of cues and informational cascades on participation in online political communities. *New Media & Society*, *14*(8), 1286-1303. https://doi.org/10.1177/1461444812445877

Vicente, M. R., & Novo, A. (2014). An empirical analysis of e-participation. The role of social networks and e-government over citizens' online engagement. *Government Information Quarterly*, *31*(3), 379-387. https://doi.org/10.1016/j.giq.2013.12.006

Vosoughi, S., Roy, D., & Aral, S. (2018). The spread of true and false news online. *Science*, *359*(6380), 1146-1151. https://doi.org/10.1126/science.aap9559

Vromen, A., Loader, B. D., Xenos, M. A., & Bailo, F. (2016). Everyday making through Facebook engagement: Young citizens' political interactions in Australia, the United Kingdom and the United States. *Political Studies*, *64*(3), 513-533. https://doi.org/10.1177/0032321715614012

Wang, H., Cai, T., Mou, Y., & Shi, F. (2018). Traditional resources, Internet resources, and youth online political participation: The resource theory revisited in the Chinese context. *Chinese Sociological Review*, *50*(2), 115-136. https://doi.org/10.1080/21620555.2017.1341813

Woo, J., & Kim, M. G. (2009). News media use, citizen communication, and civic participation: A communication mediation model. *Journal of Policy Studies*, *24*(2), 47-68. https://doi.org/10.52372/kjps24203

Wooldridge, J. M. (2010). *Econometric analysis of cross section and panel data*. MIT Press.

https://doi.org/10.52372/jps.39401

Yamamoto, M., Nah, S., & Bae, S. Y. (2020). Social media prosumption and online political participation: An examination of online communication processes. *New Media & Society*, *22*(10), 1885-1902. https://doi.org/10.1177/1461444819886295

Yue, A., Nekmat, E., & Beta, A. R. (2019). Digital literacy through digital citizenship: Online civic participation and public opinion evaluation of youth minorities in Southeast Asia. *Media and Communication*, *7*(2), 100-114. https://doi.org/10.17645/mac.v7i2.1899