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Reinforcement Effects between Digital Media Use and Political Participation:

A Meta-analysis of Repeated-wave Panel Data

A RESEARCH NOTE

ABSTRACT

As digital media use has rapidly increased in prevalence and diversified in form, scholars across the globe have focused extensive attention on how the use of digital media relates to political participation. To assess the results of this emerging body of research, we conduct the first meta-analysis of repeated-wave panel data studies on the relationship between digital media use and political participation. The findings, based on 38 survey-based, repeated-wave panel studies (279 coefficients) bring new evidence to bear on two questions central to this literature. First, the findings provide new insight into the classic *mobilization* versus *reinforcement* debate: contrary to common assumption, the findings support a reinforcement effect, whereby those who are already politically active are motivated to use digital media. Second, the results indicate that the relationship between digital media use and political participation is durable, as studies with a longer time lag were more likely to yield positive and significant effects. Taken together, this evidence in support of a durable reinforcement effect implies the potential for digital media use to contribute to increased inequality in political participation over time. In the concluding discussion, we outline directions for further theoretical inquiry and empirical research that leverage the value of repeated-wave panel studies to make causal inferences.

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Among the questions that arise from the increased prevalence of digital media use, arguably one of the most critical lines of inquiry is how it relates to political participation. From early examinations of the potentially isolating effects of personal computing to the contemporary focus on the ubiquity of smartphones, a common concern that accompanies changing information environments is the potential for disengagement and inequality of political participation (Putnam 2000; Hooghe and Oser 2015).

While prior meta-analyses clearly establish a positive relationship between digital media use and political participation, these studies have noted that the vast majority of extant research on this topic is based on cross-sectional data (Skoric et al. 2016; Boulianne 2018; Chae et al. 2019). Because cross-sectional data analyses cannot determine the temporal order of relationships, researchers have been unable to make causal inferences about the effect direction in the relationship between digital media use and political participation. In contrast, repeated-wave panel data provide the empirical basis for a more rigorous investigation of this relationship.

In this study, we conduct the first meta-analysis of repeated-wave panel data studies on the relationship between digital media use and political participation to address two central questions in this field of study. First, we investigate the empirical support for the *mobilization* thesis and the *reinforcement* thesis to determine whether the causal relationship is such that media use motivates participation, or whether participation motivates media use. Second, we assess whether the relationship between digital media use and political participation is an enduring one that is evident even when testing for long-term effects.

We conduct this study at a timely moment when this field of research is flourishing, as among the 38 repeated-wave panel studies that meet the criteria for inclusion in the present study, 21 have been completed since 2017. The meta-analysis results, based on 38 survey-based repeated-wave panel studies (279 coefficients) conducted between 1982 and 2017 in a

wide range of contexts, show that there is a positive relationship between digital media use and political participation. However, this relationship depends on the causal flow and length of time between the waves of the panel.

Mobilization versus reinforcement

Causal direction

Almost twenty years ago, Norris (2000) outlined three possible relationships between media use and political participation that remain relevant for contemporary research on media effects. *Mobilization* is the idea that media use motivates political participation; *reinforcement* is the idea that political participation motivates media use; and finally, a *virtuous circle* implies reciprocity in the relationship between media use and political participation. While early research on digital media referenced the importance of understanding the causal direction, these ideas remained largely untested due to the lack of repeated-wave panel data. However, in the past few years, these repeated-wave panel designs have become very popular, allowing for a body of scholarship that can be systematically analyzed in relation to reinforcement versus mobilization effects.

The mobilization thesis suggests that digital media use plays a causal role to *mobilize* less engaged people to become more politically active. Digital media use may mobilize people by exposing them to information that encourages them to participate (e.g., campaign information encourages voting), or by providing a low-effort entry point into public affairs that motivates further participation (e.g., signing a petition, and then participating in a public march) (Xenos and Moy 2007; Edgerly et al. 2018). Digital media use may expand participation beyond the usual suspects, and therefore decrease participatory inequalities. In contrast, the reinforcement thesis implies that digital media use *reinforces* the political activism of those who are already active. People who are interested and engaged in politics

may use digital media to further inform their participation, or to document that they participated (e.g., post a voting selfie). In this scenario, digital media would exacerbate well-established participatory inequalities (Schlozman et al. 2010; Oser et al. 2013). As Norris noted, evidence that supports the reinforcement thesis would suggest that digital media use will “strengthen, and not radically transform the existing patterns of social inequality and participation,” thereby potentially widening participation gaps between the haves and the have-nots (Norris 2000, pp.121-122).

Finally, the *virtuous circle* thesis proposes an expectation of similar strength of both the mobilization and reinforcement effects in a reciprocal relationship. The virtuous circle theory has been further developed as a reinforcing spiral (Slater 2015). For example, research in relation to reinforcing spirals that focuses on political interest among youth in Sweden indicates a widening gap in political interest between those who participate and those who do not participate (Moeller et al. 2018).

Enduring effects

In addition to the importance of assessing the causal direction of the relationship between digital media use and political participation, it is also critical to assess whether the relationships identified endure over time. Cross-sectional surveys can document a correlation between these variables, such as Chae et al.'s (2019) report of average bivariate correlations. Repeated-wave panels can more clearly identify how changes in media use connect to changes in participation, and thus offer a stronger case for causality.

Repeated-wave designs are useful for assessing the direction of causal effects linking digital media use and political participation, as well as the longevity of the relationship. A common critique of experimental designs is that post-tests tend to be conducted immediately after the intervention, and thus these designs do not assess enduring or long-term effects. In

contrast, repeated-wave panels often have time gaps of months or even years, which allow researchers to evaluate the longer term effects of causal variables and thereby assess the durability of a relationship.

Methods

A meta-analysis is a quantitative content analysis of the existing research on a topic, and our focus is on summarizing tests of relationships between variables. For our examination of the relationship between digital media use and participation, we rely on tests of relationships derived from the analysis of survey data, following the extant meta-analyses in the field (Skoric et al. 2016; Boulianne 2018; Chae et al. 2019). While meta-analysis often focuses on effect sizes, we use the vote-counting method, which is a common approach in many meta-analyses of voting (e.g., Smets and van Ham 2013; Cancela and Geys 2016).

This is the most appropriate meta-analytic method for analyzing the repeated-wave studies in our sample because the diversity of effect estimates poses challenges for calculating valid effect sizes.¹ The vote-counting method focuses on analyzing whether or not the relationship of interest is significant according to standard conventions in social science, and is therefore limited due to the use of specific significance thresholds and the lack of effect size estimation. Despite these limitations, this is the optimal technique for studies like ours in which there is not a common outcome measure (e.g., Strandberg 2008; Stockemer et al. 2018). We use $p < .05$ as a common threshold for determining statistical significance, following established practice in social science. We also examine whether the effect is positive or negative, which is reported for 244 of 279 effects.

Meta-analyses of survey data do not routinely make a distinction between different types of surveys (Čehovin et al. 2019), even though it is widely recognized that repeated-

¹ See online Supplementary Data for additional discussion of the vote-counting method.

wave panel data can provide a more rigorous evidentiary basis for testing relationships between key variables (Wooldridge 2010). The meta-analysis sample includes 38 studies, which is more than sufficient for obtaining valid results. The rapidly growing number of repeated-wave panel data studies in this field of research necessitates a “state of the art” assessment that identifies accumulated knowledge on these topics. This type of synthesis is particularly important due to the relatively high expense and demanding time investment required by this research design in comparison to more common cross-sectional studies.

The studies were identified between May 2015 and February 2019 by searching academic databases and Google Scholar, using the following terms: “Internet,” “web,” “online,” “digital media,” “social media,” “civic or political” and “engagement or participation.” We also used the reference lists of studies identified by search terms to find additional relevant studies. We focus on longitudinal studies that measure changes in the dependent variable over time, or that measure independent variables at time 1 and dependent variables at time 2.

For digital media use, we focus on measures of activities (e.g., *use* of online information sources), rather than attitudes (e.g., *trust* in online information sources). Common measures of digital media use in this literature are: online news (most popular), news through social networking sites, online political expression, and email. For political participation measures, we include studies using behavioral measures, rather than measures of willingness or intent to participate. Common measures of political participation combine electoral, civic, and protest activities, such as voting and protesting. We focus on studies that make a clear empirical distinction in the analysis of online versus offline political activities, and therefore exclude studies that blended online and offline participation measures (e.g., an additive index that combines voting with signing online petitions).

Findings

Profile of studies

The full list of references for the 38 meta-analysis sample studies are noted in the online Supplementary Data. Table 1 provides a profile of the sample studies and the effects reported in each study. The sum of the sample sizes of all the studies in the meta-analysis is more than 70,000 respondents who completed at least two waves of a survey. Approximately half of the studies use samples from the United States, while the other half use samples from Belgium, Canada, Chile, China, Denmark, Germany, Israel, the Netherlands, South Korea, Sweden, Taiwan, and the United Kingdom. The effects are also distributed similarly: approximately half of the effects represent U.S. respondents and the other half represent respondents outside the United States.

[INSERT TABLE 1 ABOUT HERE]

Some surveys were analyzed in multiple publications, but definitive survey identification is difficult, as the surveys are rarely named. Based on the characteristics of the study (e.g., geographic location, data collection time period, sample type, sample sizes), we estimate that approximately 26 distinct datasets were analyzed in these studies. The earliest panel data in the sample was collected (wave 1) in 1982, and the latest reported data collection was in 2017, with most of the studies (n=31) including two waves. The studies were published between 2003 and 2019 with evidence of robust increase in recent publications on these topics, as 21 of the 38 studies were published since 2017.

While no formal tests are available to establish publication bias for our sample, the 38 identified studies are the result of a thorough review of research in the entire field of published and unpublished studies. Thus, our sample aims for a census, rather than a representative sample, and null findings are clearly the most popular finding in our sample.

Meta-analysis results

Table 2 summarizes the aggregate findings in terms of positive and negative effects. The findings show that 68% of coefficients are positive, but for a sizeable proportion of the coefficients (12.5%), researchers report a non-significant effect without noting the effect direction. The proportion of coefficients that are significant at the .05 level is 31%, with 29% positive and 2% negative. These findings point to a positive association between digital media use and political participation.

[INSERT TABLE 2 ABOUT HERE]

Table 3 extends these findings based on a multivariate moderator analysis that investigates causal order of digital media use and political participation, and the length of time between waves. The findings show that the direction of causal flow impacts the likelihood of generating a positive and significant effect. Approximately 44.6% of tests for reinforcement are positive and statistically significant, whereas only 29.8% of the tests for mobilization are positive and statistically significant. In sum, when the relationship is modelled as participation leading to digital media use (reinforcement), the effect is more likely to be positive and significant ($p=.031$).

Although most research on these topics (cross-sectional and longitudinal) assumes a temporal flow from digital media use to political participation, these meta-analysis findings do not support the *mobilization* thesis, as the effects are more likely to be positive and significant in the reverse direction. Likewise, the findings do not indicate a *virtuous circle* effect, as this thesis would be supported if the evidence showed no meaningful difference in the significance of the mobilization and reinforcement effects.

The results show that, contrary to the assumption in the literature, the empirical evidence supports a *reinforcement* effect. Indeed, evidence of this causal direction is present even in the first published repeated-wave panel study in this area of research, which modeled

civic engagement in 1982 as a predictor of Internet use in 1997 (Jennings and Zeitner 2003). Thus, researchers exploring these topics cannot assume that the causal effect is a mobilizing force that runs from digital media use to political activation – whether the research design includes the interpretation of cross-sectional effects or the empirical modelling of longitudinal studies.

[INSERT TABLE 3 ABOUT HERE]

The findings also indicate that the length of time between waves matters. When designing a repeated-wave survey, researchers often struggle to identify an appropriate time gap due to the competing challenges of panel attrition (a disadvantage of longer time frames) and the capacity to measure change or long-term impacts (which requires a longer time frame). To test the persistence of the relationship, we use the length of time between panel waves as a moderating variable, defining short time frames as less than six months and longer time frames as more than six months. Of the tests based on long-term panels, 38.9% of tests are positive and statistically significant, in contrast to 24.2% of tests based on shorter panels.

The findings in Table 3 show that studies with a time lag of more than six months are more likely to identify a significant and positive relationship between digital media use and political participation than panels with shorter time intervals ($p = .017$). This evidence points to an enduring relationship between digital media use and political participation that is even more prominent when testing for longer-term effects. This two-part finding – that there is a *positive* and *enduring* relationship between digital media use and political participation, and that this relationship is strongest when modeled as a *reinforcement* effect – is an important contribution to ongoing debates in the literature.

Discussion

In sum, we offer the first meta-analysis of repeated-wave panel studies that investigate the relationship between digital media use and political participation. Analyzing 279 effects reported in 38 studies based on data from more than 70,000 respondents, we found that the relationship between digital media use and political participation was often positive (68%), and that 31% of effects were statistically significant. A test of causal direction showed that the effects were more likely to be positive and significant when the relationship was modelled as a reinforcement effect (i.e., participation leads to media use) than when it was modelled as a mobilization effect (i.e., media use leads to participation). This finding provides support for the reinforcement thesis as described by Norris (2000), with the implication that digital media use may exacerbate participatory inequality.

This evidence in support of the reinforcement effect implies there is potential for increased inequality in political participation over time. The findings therefore question the predominant assumption about causal flow in the existing literature and highlight the need for further research using different modelling choices to test these relationships.

As the present study provides new, definitive evidence in favor of reinforcement effects, we conclude by suggesting future research that may advance the study of causal dynamics and context effects. The question of the causal direction of short-term versus long-term effects deserves further attention, as we observed that modelling reinforcement effects is a common feature of longer term panels (e.g., Jennings and Zeitner 2003). To untangle the distinct effects of causal flow and panel length, further research should investigate mobilization versus reinforcement causal flows with attention to short-term versus long-term effects, and the number of survey waves. The most common approach is to measure a stimulus (wave 1) and a response (wave 2), when the causal process could be much more complicated. Further research could offer a more robust test of causal processes, such as the O-S-R-O-R model (Cho et al. 2009), by analyzing original survey data across multiple

studies to test for mediating factors (e.g., political discussion) in the relationship between digital media use and political participation. Another important line of research would be to test reinforcing spirals using more than two waves of survey data (Slater 2015).

The effect of country context is an important line of future research as well, as it is possible that in less developed countries in which digital media use is less prevalent, the adaptation and use of these technologies may have more of a mobilizing effect than in contexts that are already saturated with high levels of digital media use. Age effects also deserve further investigation in order to test the presumption in the literature that younger age groups are more likely to experience a mobilization effect, whereas older adults are more likely to adapt from being politically active in the offline realm to becoming active online (reinforcement) (Kim et al. 2017). A larger sample of studies is necessary in order to fully test these additional research design effects, and given the fast pace of the emergence of these studies, we expect ample opportunity for researchers to more fully investigate these relationships in future research.

Supplementary Data

Supplementary data are freely available at *Public Opinion Quarterly* online.

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Table 1. Profile of studies and coefficients

Sample Characteristics	Number of coefficients	Number of studies
<i>Type of sample</i>		
University students or other school-based samples	142	11
Other youth sample	22	5
Random sample, such as random digit dialing surveys	52	8
Online panels matched to Census characteristics	41	13
Other types of samples, including surveys of social media users, intercept street surveys, etc.	22	3
<i>Country</i>		
United States	137	18
Outside the U.S.	142	20
<i>Sample size</i>		
Less than 250 respondents	18	2
250 to 499 respondents	129	13
500 to 749 respondents	37	8
750 to 999 respondents	35	4
1000 to 1249 respondents	15	4
1250 to 1499 respondents	16	4
1500 and more respondents	29	7
Total	279	38

Notes: Although the meta-analysis is based on 38 studies, the sample characteristics reported in Table 1 total more than 38 sample sources because two studies analyze more than one sample (Kahne et al. 2013; Kim et al. 2017). In addition, Emmer, Wolling, and Vowe (2012) report on multiple survey waves. Of the 20 studies outside of the U.S., five samples are from Sweden; three from Canada; and three from Germany; and samples from all the other countries were used only in one study (Belgium, Chile, China, Denmark, Israel, Netherlands, South Korea, Taiwan, and the United Kingdom).

Table 2. Aggregate findings

Direction		Number of coefficients	Percentage of total coefficients
Positive Coefficients	<i>Statistically significant*</i>	81	29.03%
	<i>Not statistically significant</i>	109	39.07%
Negative Coefficients	<i>Statistically significant*</i>	6	2.15%
	<i>Not statistically significant</i>	48	17.20%
Direction not reported	<i>Not statistically significant</i>	35	12.54%
	Total	279	

* $p < .05$

Table 3. Digital media use and participation: Causal flow, and time lag effect

	Positive and significant	Positive, but not significant	Negative and significant	Negative, but not significant
<i>Causal flow</i>				
DM to Participation (mobilization)	29.8% <i>n</i> = 56	44.1% <i>n</i> = 83	2.7% <i>n</i> = 5	23.4% <i>n</i> = 44
Participation to DM (reinforcement)	44.6% <i>n</i> = 25	46.4% <i>n</i> = 26	1.8% <i>n</i> = 1	7.1% <i>n</i> = 4
Pearson Chi-square = 8.853 <i>p</i> = .031				
<i>Length of time between waves</i>				
Less than 6 months	24.2% <i>n</i> = 23	44.2% <i>n</i> = 42	3.2% <i>n</i> = 3	28.4% <i>n</i> = 27
More than 6 months	38.9% <i>n</i> = 58	45.0% <i>n</i> = 67	2.0% <i>n</i> = 3	14.1% <i>n</i> = 21
Pearson Chi-square = 10.154 <i>p</i> = .017				

Note: The analysis is based on a series of cross-tabs or contingency table analysis; *p*-values are based on two-tail tests.