

# The Main and Spillover Effects of Online Deliberation: Changes in opinions, informational media use and political activities

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**Abstract**—This study examines the main and spillover effects of online deliberation. According to theoretical arguments of deliberative democracy scholars, we defined the main effects as changes in opinions on discussion issues. The spillover effects refer to changes in behaviors that are not directly related to online deliberation activities. In particular, we look at the spillover effects on informational media use and political activities. Relying on two-wave surveys that interviewed 510 citizen participants who used an online deliberation platform for three weeks, we compared the pre- and post-deliberation measures of the outcome variables. Our analyses reveal that most of opinions changed after deliberation but the nature of the changes depends on specific issues. The spillover effects are found to be particularly significant in online media use and social media based political activities. We conclude that both the main and spillover effects are unneglectable outcomes of online deliberation but their patterns are supported by difference mechanisms.

*Keywords-deliberation; effects; internet; media; opinion; political participation; social media*

## I. INTRODUCTION

Online deliberation as a novel practice of combining the Internet technology and the ideal of deliberative democracy has been in increase in many parts of the world. From early-days bulletin board systems to more recent web 2.0 interfaces, many technological innovations have been devoted to developing online tools that can facilitate citizen discussion on public issues. On the other hand, as existing democratic models continue to perform poorly, alternative models such as deliberative democracy give great promises. The effort of combining novel technologies with a relatively new democratic idea thus becomes necessary. However, such effort needs to be empirically verified in terms of its effects and mechanisms behind making such effects. There still lacks comprehensive evidences examining both expected and unexpected effects of online deliberation. This paper presents such an effort of empirically verify various effects including both the main ones and those that are not directly related to online deliberation, which we call spillover effects. This paper starts from a brief review of theories and existing practices (including offline deliberation) of deliberation. We introduced three hypotheses based on both theoretical arguments and previous findings. The method section includes a detailed description of the process of online deliberation as we conducted it. We then presented findings regarding post-deliberation changes in opinions, informational media use, and political activities. We ended the paper with a few preliminary conclusions and some suggestions for future research.

## II. BACKGROUND AND RELATED WORK

### A. Theories and deliberation practices

Online deliberation is a research field inspired by political philosophies such as public sphere and deliberative democracy. In Habermas' seminal work "Structural Transformation of Public Spheres" [1], he made a compelling argument that we need a sphere for the publics to form informed and well contested opinions, in order for these opinions to input into formal decision making such as policies. Due to the limitations of modern mass media, public sphere is hard to achieve when publics are turned into mere spectators, who only read or watch elites debating without themselves discussing the issues. It thus becomes an appealing idea to construct and foster spheres for the particular purpose of advancing citizen discussions on public issues. In

the United States, Guttmann and Thompson [2] proposed a similar idea called “Deliberative Democracy”. To them, deliberative democracy is an alternative democratic model to existing ones such as aggregative democracy or representative democracy. Deliberative democracy is able to overcome many limitations the existing democratic models have. For instance, simple aggregation mechanisms such as voting tend to favor the majority views regardless of the quality of such views. In view of representative democracy that puts the burden of rational debate only on selected representatives, citizens are alienated from the important discussions that could influence their day-to-day life and could result in lack of understanding and support of policies generated by the representatives. Furthermore, deliberative democracy is particularly valuable in a diverse society that often includes fundamentally different values. By encouraging respectful and reasoned exchange of views, deliberative democracy is able to not only generate quality decisions but also foster tolerance and mutual respect among diverse social groups. Habermas considered such cohesion-building a unique strength of deliberative democracy, combining the freedom liberal democracy advocates with the solidarity communitarian democracy offers [3].

Contemporary practices of citizen deliberation are many and varied [4]. New England town hall meetings [5] in the US have been seen as one of the pioneering practices of deliberative democracy. In these meetings, all town residents are allowed to join a face-to-face gathering that opens the floor to theoretically anyone who wants to talk on some significant issues for the town. After hours of talk and discussion, these town hall meetings make decisions on the issues and such decisions will be respected by all town residents. Recent development in the line of town hall meetings is participatory budgeting [6] or city planning [7], where citizens are invited to input to budget making or space planning at city or state levels. Another US-based long term practice is jury deliberation [8]. The American juries are made up of ordinary citizens through a selection process that does not require the jury members to be law professionals. After being enlisted to be a jury member, ordinary citizens will have to sit in the trials, examine the evidences carefully, and have rational debate among themselves to decide whether a person is guilty or not. We can see that town hall meetings are good at being open and inclusive (at least to the town residents), while juries have their strength in rational debate. In other words, town hall meetings face the challenge of scalability when we want to expand such practices to national levels. Jury deliberation, on the other hand, have the challenge of being too demanding in terms of reason-making. There exists a tension between quantity and quality of participation.

A prominent effort that tries to address the tension between quantity and quality of participation is Deliberative Polling (DP), a practice that combines random sampling techniques with small group discussions [9]. In order to address the scalability issue, DP recruits a random sample of the target population to join the discussion. By doing so, the discussion outcomes can be representative of the whole population whereas the actual number of participants can be kept manageable. The recruited random sample of 1,000 or 2,000 participants are then brought into a physical location to discuss for one or two days on the selected public issues. At the beginning of the discussion, each citizen participant is offered both reading materials and a Q&A session with a group of policy experts. Then the participants are separated into small groups of 10 people or so to discuss. Moderators are often assigned to each of the groups to make sure the discussion runs smoothly. At the end of the group discussion, the group members will make a collective decision on what needs to be done. A series of studies on DP has shown that this practice can effectively change citizens’ opinions.

When the Internet becomes common in everyday life, the effort to use online spheres for deliberation purposes starts to flourish. We define online deliberation as “citizen discussion, supported by online technologies, for the purpose of collective decisions such as policy-making”. Our definition is rather broad, which could cover both “naturally occurring” and “purposefully constructed” online spaces for deliberation [10]. Research on naturally occurring spaces often takes the normative approach of evaluating the deliberation potential of such spaces. For instance, after clarifying a set of deliberation criteria such as reason and respect, a study on Usenet groups [11] examined how design features influence the deliberative quality of discussions. Similar examinations have been made on discussion forums [12, 13, 14], blogs [15], social network sites [16], news websites comment sections [17, 18], Wikipedia [19], in various countries and contexts. In contrast, the purposefully constructed spaces often aim to provide a wholesome solution to deliberation challenges by designing a designated space that incorporates technological features that are supposed to facilitate deliberation. From Minnesota e-Democracy [20] to Reflect [21] to Deliberation Graph [22] to many other online consultation [23] and rule-making projects [24], academics, governmental agencies, and NGOs have invested heavily in developing such designated spaces. Research on this category of online deliberation practices has identified a series of design factors that should be carefully thought through and empirically tested, including anonymity, asynchronicity, moderation, communication modes, and cognitive cues [25].

## *B. Main and Spillover Effects*

According to the deliberative democracy theorists, there are benefits of deliberative democracy that other democratic models do not enjoy. One of the main positive effects is the “epistemic value” of deliberation [26]. The epistemic value refers to the cognitive gain of individual participants, which eventually leads to better collective decisions. This theoretical benefit of deliberative democracy has received much academic attention and empirical verification. Basically, there are multiple pieces of evidences showing that deliberation is able to change participants’ opinions, increase issue knowledge, enhance one’s understanding of opposing arguments and perception of political diversity [27, 28, 29, 30]. Such cognitive gain is supposed to be achieved through exposing participants to disagreeing viewpoints, stimulating them to think harder about their own opinions, and encouraging them to change towards the better argued positions. In addition to these identified mechanisms, this paper proposes that another mechanism that may work for the cognitive gain is to prompt participants to look for more

information and pay more attention to issue-related news. We argue that although online deliberation puts participants into a designated space, participants still have their daily routines to follow, including reading news from traditional and online media sources. The deliberation experience may trigger their curiosity in the issue and lead them to search for more information. Also, exposure to disagreeing viewpoints may make participants want to verify whether his/her own opinions have merits and/or to monitor how the larger society thinks about the issue. In other words, deliberation has effects that do not just stay within the designated space on the deliberation topic but could spill over into other parts of participants' daily life and issue engagement.

The spillover effect [31] or "side-effect" [32] of deliberation is worth examining. We define spillover effects as effects on things that are not directly related to the deliberation topic or the deliberation experience itself. Political perceptions such as knowledge, interest, efficacy, and trust, as well as political activities such as interpersonal talks have all been listed as potential spillover effects. Due to the space limit, our paper focuses on a set of political activities as our spillover outcomes. The most important reason of examining such spillover effects is to acknowledge that new practices like deliberation cannot be isolated from existing reality. As many critics of deliberative democracy pointed out [33], deliberation is impossible to ignore the existing power relationship. If a political system is by nature illiberal, for instance, deliberation effects in such a system are expected to be very different from those in a political system that has developed into a mature democracy. Even within a democratic system, deliberation as a mode of political engagement has to co-exist with an array of other political activities such as voting, protesting, etc. There are two possible directions to pursue when it comes to spillover effects on political activities: Firstly, a time replacement theory suggests that the more time one spends on deliberation, the less time one may have for other political activities; secondly, an augmentation theory stipulates that deliberation can increase political engagement in general, which will enhance the overall activeness in politics. It is therefore hard to predict whether the changes are of positive or negative nature. We hypothesize the following based on the literature review and theoretical discussions above.

H1: Online deliberation will change participants' opinions on the policy issues.

H2: Online deliberation will change participants' informational media use.

H3: Online deliberation will change participants' political activities.

### III. METHOD

#### A. *The Online Deliberation Process*

The process of the OD\_SG had four phases: (1) the education phase, during which the issue education materials were developed, verified with policy makers, translated to user-friendly interactive formats, and pre-tested with users; (2) the recruitment phase, during which a nationally representative sample of 2,006 Singaporean citizens was surveyed and invited for participation; (3) the deliberation phase, during which the participants, including both citizens and policy makers, used our platform and its various technological features; (4) the reflection phase, during which the users and policy makers were surveyed or interviewed again for their evaluations and feedback. In the following-subsections, we will introduce how design is used to address challenges in each phase.

##### 1) *The Education Phase*

One of the prominent challenges surrounding citizen input to policy making is the lack of knowledge and expertise with regards to the policy issue among ordinary citizens. Deliberative Polling [9], for instance, has criticized conventional polling results as reflections of uninformed, and ill-conceived opinions that are of little value as policy input. In addition to issue knowledge, another challenge in terms of citizen education concerns citizens' lack of knowledge of the platform, which is often new technological design and unfamiliar to ordinary users. Both education challenges are particularly significant if we aim for involving a representative sample of population, which clearly shows differentiations in terms of both issue and technological knowledge.

We have introduced two sets of education materials to address such challenges:

- Issue education materials were developed by a team of policy researchers, in consultation with the government agency that is in charge of tackling the population issue. The materials were carefully composed to be balanced in tone and to provide sufficient whereas easy to grasp information for the general public. These materials were made compulsory for every citizen user to go through when they logged in the platform the first time. The materials were also available for re-viewing if the user would like to.
- Platform education materials were developed by the technological design team and presented in two ways: one is a compulsory two-minute video that citizen users had to go through upon first-time logins; the other is a help page that explains in details how each technological feature works, as well as how citizen users are expected to behave. Again, both the video and the help page were available for re-viewing if the user would like to.

##### 2) *The Recruitment Phase*

Previous deliberation projects, including both online and offline ones, were often subject to the weakness of lack of representativeness. Majority of such projects relied on self-selection or voluntary participation from the citizens. In other

words, who participated in the deliberation phase completely depends on individual citizens' willingness. Deliberative Polling, for example, tried to counter this problem by randomly recruiting a representative sample of the population. However, we have to be aware that even random sampling does not guarantee representative samples due to refusals and non-responses. There needs to be more measures to motivate citizens to join deliberation. We thus employed two measures at this phase:

- Quota sampling of the Singaporean population was used to ensure the representativeness of the group of people we sent our invitations to. An online panel provider was engaged to access a large respondent panel with 20,000 over Singaporeans on board. Demographic quotas were set to match the most recent census data and random sampling was done with the quota being monitored closely. In other words, we checked the demographics quota every day to understand which groups of citizens were not well represented in our respondents and we adjusted our aggressiveness of recruitment (i.e., sending email reminders and raising the monetary incentives) based on such understanding.
- Engaging in a three-week online deliberation is time consuming, and potentially tiring. It is expected that some citizen users will drop out the deliberation for that reason. However, dropouts became a problem if only certain groups of citizens dropped out, instead of random dropouts across demographic strata. It is likely that the disadvantaged groups dropped out due to lack of resources, such as time and money to spend on online deliberation. We thus provided an incentive mechanism to sustain participation, especially from those who have lower economic resources. We provided 50 Singapore dollars when citizens opted in the deliberation phase. Depending on their activeness of participation (i.e., points gained through liking, disliking, posting, etc), citizen users could earn up to an additional amount of 30 dollars.

### 3) *The Deliberation Phase*

The three-week deliberation phase spanned from May 4 to 25, 2016. The three weeks were divided to three stages, and in each one-week stage, citizen users were invited to discuss one sub-issue related to population, namely, fertility, foreign workforce, and social integration. There is a short but carefully crafted opening message posted to each sub-issue discussion board at the beginning of the discussion. Moderators were present to identify spammers and to eliminate bullying or trolling. But other than these basic moderation tasks, moderators were not involved in directly debating or discussing the issues with citizen users. At the end of each discussion, an online poll was set up based on moderators' reading of opinions/suggestions that emerged during the discussion. All participants were sent an email reminder, inviting them to vote in the polls.

The policy maker interface was also made open for the policy makers to do quick and easy analyses of the discussion. Details will be provided later in the section on platform features.

### 4) *The Reflection Phase*

Last but not least, we returned to our citizen users and policy makers for their feedbacks after the closure of the deliberation phase. Two kinds of reflections were made for different groups of stakeholders:

- For citizens, we did a post-deliberation survey with close-ended evaluation questions and an open-ended feedback question. In the evaluation questions, citizen users were asked about their evaluation of the entire system, its various technological features, their perception about citizen deliberation as a political institution, their emotional reactions during the deliberation, and many more. The open-ended feedback question invited citizen users to input any thoughts regarding the deliberation processes and technologies.
- For policy experts, we held two briefing meetings to present our initial findings and elicit their feedbacks regarding the usage of the platform. The two meeting were both held in August 2016, not long after the closure of deliberation

## B. *Sample and Data*

The data used in this paper came from two sources: A pre-deliberation survey, and a post-deliberation survey. 47.6% (N= 2,006) of respondents who started the pre-deliberation survey (N = 4,215) completed the survey. We used quota sampling to ensure that these 2,006 respondents were representative of the national population. The rest included those who have declined the survey consent (7.7%), those who were not eligible due to their status of non-citizens (10.2%), incomplete data (32.1%), or who have declined the invitation to be part of the OD\_SG project (2.5%). The pre-deliberation survey was conducted from April 15 to May 6, 2016. The average completion time for a pre-deliberation survey was 25 minutes.

The post-deliberation survey had a total sample size of 510, of which 456 participants completed the survey, with a response rate of 97.4%. The post-deliberation survey was conducted from May 27 to June 13, 2016. The average completion time for the survey was 22 minutes.

## C. *Measures*

The paper examines two sets of dependent variables that are used as indicators of main and spillover effects: (1) opinion changes as main effects, (2) media use and (3) political activities as spillover effects.

### 1) *Opinion change*

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We measured participants' policy attitudes towards the sub-issues of fertility rate, foreign workforce, and social integration of new citizens in both pre- and post-deliberation surveys. The policy attitudes questions included *policy support* questions each targeting a specific policy that has been implemented by the government. Another factor that could be influenced by deliberation is *perceived policy influence or effectiveness*, which examines the extent to which a policy is perceived as capable of addressing the problem that it is trying to solve. We also measured *attribution of responsibility*, which indicated how moral accountability is assigned to various *actors* by participants for different sub-issues. The three actors we were interested in was the government, the individual and the broader community. All questions were measured using a five-point Likert scale (1= strongly disagree to 5 = strongly agree).

### 2) Informational media use

To measure participants' informational media use, we asked them to indicate how often they used mainstream media and social media for information on issues related to the country's population. What makes mainstream media "mainstream" is its institutionalised structure and how it is connected to "power centres" such as governments and corporations [34]. Due to their connections with the power centres, mainstream media typically propagates a certain view. However, new technologies have provided additional platforms for individuals and groups to disseminate information [35]. Thus, in our study, mainstream media comprises official or traditional sources of news and information. These include print newspapers, television, radio and websites of mainstream media websites. Social media includes blogs of individuals or groups, YouTube sites of individuals or groups, online discussion forums/portals, social networking sites and Instant Messaging platforms), while social media consists of informal and networked-based sources such as blogs and social networking sites. The same measures were used to in the pre- and post-deliberation surveys. We used a five-point Likert scale (1 = never, 2 = once a week or less, 3 = a few times a week, 4 = once a day, and 5 = several times a day) to measure the frequency of participants' information media use.

### 3) Political activities

We classified political activities into two groups: offline and online political activities. Offline participation is measured using three individual items with a five-point scale (1 = never, 5 = several times a day). The three questions include: within last six months, taking part in an event for a good cause, for example, a walkathon, a flag day or other charity event; being a member of or a volunteer in a welfare organisation or other non-governmental organisations; and attending a meeting of discussion or dialogue organized by the Residents' Committee, Community Centre, or the Government. Online participation is measured using five individual items with a five-point scale (1 = never, 5 = several times a day). The five questions include: sharing relevant information and/ or political commentaries on a political issue; writing a post/status update/message or made a video expressing my opinion on a political issue; commenting on a post/status update/message or a video about a political issue; signing a petition on social media about a political issue; and organizing an activity about a political issue on social media.

## IV. FINDINGS

In order to gauge the changes from pre- to post-deliberation, we ran a series of paired sample t-tests as the two samples of comparison are the same group of people. We used a significance level of  $p < .05$  or lower as a criterion to identify changes that are deemed statistically significant.

### A. Main Effects on Opinion Changes

The changes in policy support post-deliberation for the three sub-issues are presented in Table 1. The support for all policies decreased significantly with the exception of the policy of bringing in new citizens, which saw participants moving away from disagreeing and closer to neither agreeing or disagreeing after online deliberation (i.e., the level of agreement increased slightly). An interesting finding is that the policies of slowing down the growth of foreign workforce and growth of new citizens saw reduced support.

TABLE 1. CHANGES IN POLICY SUPPORT.

Topic	Question	Pre-Study	Post-Study
Fertility	I support policies that reduce the cost of having and raising children	4.08(.85)	3.93(.93)*
	I support policies that enhance work-life harmony	4.32(.74)	4.09(.87)*
Foreign Workforce	I support the policy of slowing down the growth of the foreign workforce in Singapore	4.03(.88)	3.88(.92)*
	I support the Fair Consideration Framework policy	4.08(.85)	3.87(.87)*
New Citizens	I support the policy of bringing in new citizens	2.74(1.16)	2.97(1.12)*
	I support the policy of slowing down the growth of the new citizens in Singapore	3.92(.93)	3.82(.91)*

	I support the Mandatory Singapore Citizenship Journey	3.72(1.04)	3.65(.98)*
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The scores reported follow this pattern: mean (standard deviation)..\*p<.05, \*\*p<.01, \*\*\*p<.001.

The impact of online deliberation on participants' perception of policy effectiveness was more mixed compared with policy support and perceived policy impact. See Table 2. After deliberation, participants felt that policies relating to the social integration of new citizens policies (especially the policy of bringing in new citizens and the Mandatory Singapore Citizenship Journey which saw significant increases) were more effective. On the other hand, the perceived effectiveness of fertility policies reduced.

TABLE 2. CHANGES IN POLICY EFFECTIVENESS.

Topic	Question	Pre-Study	Post-Study
Fertility	The policies reducing the cost of having and raising children are effective	3.18(1.03)	3.03(.99)*
	The policies enhancing work-life harmony are effective	3.20(=1.01)	3.07(.97)*
Foreign Workforce	The policy of slowing down the growth of the foreign workforce in Singapore is effective	3.13(.96)	3.12(.98)
	The Fair Consideration Framework is effective	3.08(1.02)	3.13(.93)
New Citizens	The policy of bringing in new citizens is effective	2.87(1.08)	3.07(1.01)*
	The policy of slowing down the growth of the new citizens is effective	3.06(.97)	3.09 (SD=.972)
	The Mandatory Singapore Citizenship Journey is effective	3(.99)	3.50(1.10)*

The scores reported follow this pattern: mean (standard deviation)..\*p<.05, \*\*p<.01, \*\*\*p<.001.

When it came to whose responsibility (the government, the broader community, including employers, or self) it is to solve problems concerning the population, participants felt more strongly that the government should bear the responsibility after deliberation. This was observed in all three population issues. See Table 3. The opposite effect was observed for the broader community and self.

TABLE 3. CHANGES IN ATTRIBUTION OF RESPONSIBILITY.

Topic	Question	Pre-Study	Post-Study
Fertility	It is the Government's responsibility to solve the problem of low fertility rate	3.47(1.05)	3.60(.97)*
	It is the responsibility of the broader community, including employers, to solve the problem of low fertility rate	3.67(.97)	3.58(.93)
	It is my responsibility to solve the problem of low fertility rate	3.41(1.06)	3.26(1.02)*
Foreign Workforce	It is the Government's responsibility to improve relations between locals and foreigners	3.75(.94)	3.87(.81)*
	It is the responsibility of the broader community, including employers, to improve relations between locals and foreigners	3.94(.85)	3.84(.82)*
	It is my responsibility to improve relations between locals and foreigners	3.64(.98)	3.52(.94)*
New Citizens	It is the Government's responsibility to integrate new citizens into the Singapore society	3.79(.96)	3.89(.84)*
	It is the responsibility of the broader community, including employers, to integrate new citizens into the Singapore society	3.72(.97)	3.70(.93)
	It is my responsibility to integrate new citizens into the Singapore society	3.29(1.07)	3.29(1.04)

The scores reported follow this pattern: mean (standard deviation)..\*p<.05, \*\*p<.01, \*\*\*p<.001.

### B. Spillover Effects on Informational Media Use

As shown in Table 4, media usage for information-seeking on population issues increased for all four mainstream media platforms. Online websites of mainstream media were the most used platform before and after deliberation (with 77.9% and 81.4% of the participants using the platform pre- and post-deliberation, respectively). The least used mainstream media

platform pre-and post-deliberation was radio. Television saw the highest increase in usage after deliberation, followed by radio. However, when comparing the intensity of use post-deliberation, television and online websites of mainstream media were tied, with 48% of the participants using both media a few times a week, once a day or several times a day.

TABLE 4. PRE AND POST STUDY MAINSTREAM MEDIA USE.

Media	Stage	Never	Once a week or less	A few times a week	Once a day	Several times a day
Print newspapers	Pre-Study	21.9%	35.5%	20.2%	19.3%	3.1%
	Post-Study	17.8%	33.6%	23.2%	20.6%	4.8%
Television	Pre-Study	24.6%	33.6%	20.8%	16.9%	4.2%
	Post-Study	19.5%	32%	21.3%	18.9%	8.3%
Radio	Pre-Study	43.6%	28.3%	14%	10.5%	3.5%
	Post-Study	39.5%	25.9%	17.5%	10.5%	6.6%
Online websites of mainstream media	Pre-Study	22.1%	33.6%	21.5%	15.1%	7.7%
	Post-Study	18.6%	33.3%	24.1%	15.1%	8.8%

Table 5 shows that informational media usage increased for all five social media platforms after deliberation. Social networking sites were the most used platform before and after deliberation (with 69.7% and 80.5% of the participants using the platform pre- and post-deliberation, respectively). The least used social media platforms pre-deliberation were YouTube sites of individuals or groups, and the least used platforms post-deliberation were online discussion forums/portals. Instant Messaging platforms saw the highest increase in usage after deliberation, followed by social networking sites. However, when comparing the intensity of use post deliberation, 55.7% of the participants used social networking sites a few times a week, once a day or several times a day, compared to 53.7% for Instant Messaging platforms.

TABLE 5. PRE AND POST STUDY SOCIAL MEDIA USE.

Media	Stage	Never	Once a week or less	A few times a week	Once a day	Several times a day
Blogs	Pre-Study	44.3%	44.9%	14%	5.3%	1.5%
	Post-Study	36.4%	36.4%	18%	6.8%	2.4%
YouTube	Pre-Study	48.7%	32.2%	11.2%	5.7%	2.2%
	Post-Study	35.5%	27.6%	19.3%	9.2%	8.3%
Discussion forums	Pre-Study	45.2%	35.5%	10.7%	5.9%	2.6%
	Post-Study	40.1%	31.8%	17.1%	6.8%	4.2%
Social networking sites	Pre-Study	30.3%	31.6%	18.4%	8.6%	11.2%
	Post-Study	19.5%	24.8%	18.9%	11.6%	25.2%
Instant Messaging platforms	Pre-Study	38.6%	29.6%	11.8%	8.3%	11.6%
	Post-Study	25.7%	20.6%	15.1%	7.2%	31.4%

When we compared post-deliberation media usage between mainstream media and social media, online websites of mainstream media were the most popular source of information (used by 81.4% of the participants), followed closely by television and social networking sites (both were used by 80.5% of the participants). With the exception of online discussion forums/portals (which saw the same increase in usage as television), social media in general saw a greater increase in usage post-deliberation compared to mainstream media.

### C. Spillover Effects on Political Activities

Table 6 shows the spillover effects on political activities, including both offline and online participation. The pattern is clear: with regards to offline participation, all three items did not show any significant differences. In contrast, online participation all show significant changes. Participants reported higher level of online participation after online deliberation.

TABLE 6. OVERALL CHANGES IN POLITICAL ACTIVITIES AFTER ONLINE DELIBERATION.

	Questions	Pre-Study	Post-Study
Q4	taking part in an event for a good cause, for example, a walkathon, a flag day or other charity event	1.70(.46)	1.68(.47)

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	being a member of or a volunteer in a welfare organisation or other non-governmental organisations	1.76(.43)	1.76(.43)
	attending a meeting of discussion or dialogue organized by the Residents' Committee, Community Centre, or the Government	1.83(.37)	1.81(.39)
Online	sharing relevant information and/ or political commentaries on a political issue	1.82(1.21)**	2.03(1.14)
	writing a post/status update/message or made a video expressing my opinion on a political issue	1.54 (1.10)***	1.78(1.10)
	commenting on a post/status update/message or a video about a political issue	1.65(1.13)***	1.92(1.14)
	signing a petition on social media about a political issue	1.48(1.08)***	1.69(1.05)
	organizing an activity about a political issue on social media	1.42(1.06)***	1.65(1.06)

The scores reported follow this pattern: mean (standard deviation). \*p<.05, \*\*p<.01, \*\*\*p<.001.

## V. CONCLUSION

In conclusion, online deliberation did not exert a uniform effect on people's attitudes towards population policies. The findings could be attributed to the complexity of the population issue faced by policymakers. To address the shortage of manpower resources, the Singapore government embarked on an open-door policy in the 1980s to attract foreign investors and foreign workers. While in the past citizens only had to compete with fellow citizens for employment, housing, education and transportation, they increasingly have to contend with foreigners for the limited supply of the same resources. Community leaders observed that cultural differences between different nationalities contribute to the tensions among Singaporeans and foreigners. Leong [36] posits that the economic strain is further aggravated by social and cultural differences that arise from an import of foreign cultures. Doubts over the government's pro-growth policies and simmering tensions in the society has been articulated by individuals who have taken to cyberspace to air their grouses. The government has acknowledged that the influx of foreigners exacerbated socio-economic problems and resulted in much unhappiness among Singaporeans [37]. Such challenges are likely to persist as, at a certain rate of economic growth, the population is expected to increase to 6.9 million in 2030, with up to 3.1 million PRs and non-residents included in the mix [38]. While a slew of measures were announced in 2013 to slow down the influx of foreigners [39], the government also launched a series of pro-family policies to encourage people to have more children.

The effect of deliberation on people's attitudes towards policies relating to population depended on the issue type. Support and perceived impact for all policies decreased except for the policy of "bringing in new citizens", and perceived effectiveness of all new citizens policies increased while it reduced for all fertility policies. Having children is a highly personal issue compared to foreign workforce and social integration of new citizens, and deliberation did not have any positive effects on people's attitudes towards having children. The findings point to an interesting shift in people's attitudes towards the policy of slowing down the growth of foreign workforce, one from agreement (with slowing down growth) to ambivalence. Different attitudes towards different types of foreign workforce were also observed, with more favourable reception for mid-level skilled workers and service staff. When it came to the issue of the social integration of new citizens, our findings hint at people's recognition of the need to bring in new citizens, as indicated by the shift in response from disagreement to ambivalence.

The process of online deliberation also had an impact on people's information-seeking. The use of both mainstream media and social media saw an increase in usage post-deliberation. This suggests that the process of deliberating with others could have piqued people's interest in population issues and government policies that tackle those issues, and led to them seeking more information from different sources. While the online websites of mainstream media were most used by people for population-related information, Instant Messaging platforms and social networking sites saw the highest increase in use. This finding highlights the importance of personal networks as sources of information, similar to what was found in another study on media use during Singapore's general election in 2015 [40].

Last but not least, online deliberation as a political activity had no influence on offline participation, a finding going against either the time replacement theory or the augmentation theory. Instead, a novel practice like online deliberation can co-exist with other established offline political activities because the motivation, resource, and skills involved in online deliberation may not overlap with the same factors in offline participation [41]. However, similar to informational media use, online deliberation changed participants towards more active sharing, writing, and commenting of political issues, and even more, organizing political activities on social media. This could be understood as the convenience and relatively low effort involved to move from one online space (i.e., deliberation) to other social media spaces.

We thus conclude that the main effects of online deliberation on opinion changes will have to depend on the issues of discussion. Although online deliberation can facilitate discussions of these issues among ordinary citizens, what matter more in shifting opinions are the characteristics of such issues (e.g., level of controversy) than the online platform itself. In addition, we conclude that online deliberation is able to make differences in opinions not only just through discussions on the online platform. An important mechanism behind the opinion changes is to encourage participants to look for more information through other media sources, especially online media sources. The spillover effects on political activities again confirm the close connections between various online spaces. Although online deliberation as a new practice does not interfere with offline participation, it increases participants' online participation, in particular, social media participation. In other words, the

spillover is still pretty much confined in the online space and online deliberation's influence on offline political engagement remains minimum.

Based on our findings, we suggest some future research directions for online deliberation studies. Firstly, we call to expand our imagination about the outcomes of deliberation. So far many scholars are only interested in opinion changes [9] and use them as the golden standard to evaluate whether an online deliberation practice is effective. We argue that opinion change is a complicated process that cannot be thought of a uniform shift that will always show the same influence of online deliberation. Instead, we find that opinion changes are very much dependent on the issues on which opinions are obtained. Therefore, we suggest that we should look at other expected or unexpected outcomes of online deliberation, including spillover effects and emotional responses [42]. Secondly, we call to open the process of online deliberation, as we tried to report in detail in this paper. In other words, we need to empirically verify how procedural factors such as how fair a procedure is [43] can lead to different outcomes. Thirdly, given the fact that online deliberation has to operate within an existing world that has its own "power centers" [34], we have to understand online deliberation not in isolation but in connection with other political engagement. This paper has made an initial attempt to examine the relationship between online deliberation and political activities. In the future, we can test how online deliberation does or does not change political psychologies such as authoritarian orientation and political activities such as political talk [44]. Lastly, our examination stays at the level of overall changes. It is possible that for certain groups of citizens, the changes are not the same as the overall changes. This becomes an important question especially for those traditionally disenfranchised groups [45]. We suggest that future analyses need to single out these disadvantaged groups (such as poor people, people with low education, etc) to see how online deliberation influence these people.

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