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Abstract

Open government initiatives attempt to strengthen the relationship between transparency and citizen engagement. Yet empirical assessments suggest they frequently miss their mark, thus highlighting a gap in open government knowledge: while a strong emphasis is placed on institutions in shaping the flow of government information and creating opportunities for engagement, there has been very little emphasis on citizens and ways of communicating government information to draw them to engagement opportunities. To address this gap, we design a randomized survey experiment to demonstrate how the choice of reference points – cognitive anchors that innately influence the way individuals approach decisions – used to communicate government information can play a critical role in strengthening the relationship between disclosure and citizen engagement, and in turn the effectiveness of open government initiatives. We conclude by explaining how these findings offer novel theoretical and practical insights into ways open government leveraged for purposes of enhancing citizen engagement.

Introduction

Governments are perennially confronted with the task of reforming to achieve more responsive and efficient methods of public service delivery. In many instances reform efforts seek to balance citizen engagement with concerns over efficiency, typically through the use of market mechanisms (Hood 1991; Pollitt and Bouckaert 2004). Today however, rather than looking to market mechanisms alone, government reform efforts are drawing upon a range of Internet based technologies to improve public service delivery (Dunleavy, Margetts, Bastow, and Tinklery 2006; Bolívar and Meijer 2016). This development is best illustrated by the growing popularity of open government initiatives (Bertot, Jaeger, and Grimes, 2010; Wirtz and Birkmeyer 2015).

Open government initiatives often rely on information technologies to improve transparency and citizen engagement (McDermott 2010; Lee and Kwak 2012; Zuiderwijk and Janssen, 2014; Ganapati and Reddick 2014). The expectation is that by leveraging technology to strengthen the relationship between transparency and citizen engagement in different aspects of public service delivery, open government initiatives will result in more responsive service provision (Linders 2012; Mergel 2015). Yet, evidence suggests that such initiatives frequently fall short of achieving these objectives (Evans and Campos 2013; Wirtz, Piehler, Thomas and Daiser 2015; Worthy, 2015). As a result, growing open government skepticism emanates from these total or partial failures.

This study deepens our understanding of factors contributing to the effectiveness of open government in linking transparency to citizen engagement. To complement prior open government research that attempts to identify institutional determinants of open government initiatives, we focus on citizen behavior and reason that way government information is

communicated to the public plays an important role in triggering public intentions to engage. Specifically, leveraging insights from behavioral science, we argue that the choice of reference points used to communicate government information to the public plays an important role in shaping citizen engagement intentions.

A reference point is a cognitive anchor that systematically and innately influences the way individuals evaluate outcomes or choices (Mussweiler 2003; Yockey and Kruml 2009). It does so by framing the way we interpret information. For example, in the context of performance information we can communicate a dissatisfaction rate as opposed to a satisfaction rate (reference point valence), or compare our performance to that of others (social reference point) (Olsen 2015). Using reference points to communicate government information can make this information resonate more or less. *Building on this literature, we argue two points: 1) That reference points can be used to shape the perceived salience of issues described by government information, and 2) The greater the perceived issue salience, the more inclined individuals will be to engage with government to address the issue.* While reference points are often used to manipulate human behavior in consumer sciences (e.g. Creyer 1997; Dholakia and Simonson 2005), there have been no attempts to examine whether they might also be used to stimulate citizen engagement. *Similarly, to our knowledge this is one of the first studies that applies insights from behavioral sciences to the study of open government.*

We focus on a specific application of open government – e-health portals. In the United States, every state government and more and more local governments use e-health portals to communicate large amounts of information to the public detailing important health trends in their communities (Martin et al. 2016). For example, the state of New Jersey health portal provides an "Opioid Data Dashboard" visualizes data about drug overdose deaths by year, whereas the state

of Florida health portal provides an interactive map showing users the number of pregnant women infected by Zika in a given year. The expectation is that exposure to this information will pique awareness of health risks and trigger behaviors to mitigate such risks, thus stimulating improvements in public health (Kreps and Neuhauser 2010; Park and Gil-Garcia 2017). While e-health portals are a distinct illustration of open government, at a fundamental level they are representative of open government initiatives in other areas in that they embody the notion of using transparency for purposes of engaging citizens to bring about discrete, measurable improvements to public service provision. In this sense, focusing on e-health portals for this research provides a basis from which future research examining other instances of open government initiatives can build.

We examine on how two distinct, yet complementary forms of reference points interact to shape citizen responses to state health information detailing a public health risk – the framing of mortality rates (chance of survival versus chance of death) and their context (comparisons to similar communities versus comparisons to similar public health risks). As we explain later in the manuscript, these reference points are relevant due to their theoretical and practical relevance. Findings from a randomized survey experiment and representative sample of United States citizens show that reference points can be used to deliberately shape the way citizens process state health information and heighten intentions to take action and engage with government to confront a health risk. We find that this effect on intentions to engage with government results from a distinctive mechanism -- perceived issue salience. Certain combinations of cognitive reference points are more effective at bolstering perceptions of issue salience, which in turn will increase intentions to collaborate with government.

Our findings contribute to both open government theory and practice. With respect to practice, our findings offer straightforward insight into methods for enhancing transparency to render government information more salient and heighten citizens' intentions to engage and collaborate with government. In terms of theory, our findings support the transparency -- engagement nexus that is central to the conceptualization of open government, yet also qualify this relationship by showing that it is clearly contingent upon the way government information is communicated. They also highlight the value in assuming a broader perspective in evaluating determinants of open government effectiveness by not only focusing on the role of institutions, but also citizens.

Citizen Engagement

Citizen engagement is a multifaceted construct encapsulating a variety of interrelated behaviors, such as volunteering, protesting, participating in political debates, and learning about issues confronting one's community (Norris 2001; Zúñiga, Valenzuela, and Weeks 2016). The different facets of citizen engagement, together, empower individuals to shape their own wellbeing, as well as that of their community (Delli Carpini 2000). For this reason, leveraging transparency to enhance citizen engagement in government initiatives establishes a foundation for accountable and responsive public service provision (see Gaventa and Barrett 2012 for a review).

In this study our focus is on citizens' intentions to engage with government efforts to educate the public on steps they can take to confront issues facing their community. This is considered a passive form of engagement (Fung 2006). Understanding determinants of citizens' intentions to engage in this passive form of engagement is important because it acts as a gateway to more active forms of engagement (Fung 2006; 2015; Johnson and Robinson 2014). As such,

governments often encourage citizens, for example through open government portals, to engage with government resources to learn about issues confronting society in the expectation that this knowledge will stimulate more active forms of engagement, such as volunteering or behavioral shifts (Lukensmeyer and Torres 2006). In summary, by understanding determinants of citizens' intentions to engage with government initiated education initiatives we establish a basis from which future research can build and explore implications for more active forms of citizen engagement.

From transparency to citizen engagement

Today, governments draw upon a variety of technologies to publicly disclose large amounts of information and data. To lend meaning to this information and improve its usability and usefulness, graphs and other methods of data visualization are frequently used (Barcellos et al. 2017). The assumption is that data visualization techniques will render information more salient to the general public than if raw data or abstract statistics alone were posted online. In this way, data presentation techniques play a prominent role in communicating the relevance of important issues confronting one's community (Dawes, Vidiasova, and Parkhimovich 2016). Further, by piquing perceptions of issue relevance, data presentation techniques can help establish a motivational basis for engaging with government (Jones, Rowe, and Walls 2007; Kassen 2013).

Despite the important role of data presentation, it is often overlooked. Instead, extant research on the implications of open government for public service provision emphasizes the importance of institutional factors. For example, research by Kornberger and colleagues (2017) demonstrate how the effects of open government initiatives on citizens' relationship with the state are shaped by government officials' efforts to reconcile open government principles of

"transparency, engagement, and distributed cognition" with bureaucratic principles that include, "expert knowledge, written files, and rules." Work by Piotrowski (2017) as well as McDermott (2010) shows how laws and regulations determine the extent to which open government initiatives succeed in rendering government more transparent and participatory. Complementing this insight, Yu and Robinson (2012: 178) illustrate how political factors interface with new technologies "to articulate clear priorities" when it comes to the implementation of open government initiatives.

This emphasis on institutional determinants of open government success, while insightful, overlooks the role of citizens in rendering open government initiatives successful. This gap in the literature is problematic for the reason that the success of open government is premised not only upon implementation by government agencies, but also its use by citizens. Put differently, to comprehensively understand factors that shape open government effectiveness the existing emphasis on institutions must be complemented with an understanding of citizen-level determinants of their success. An important starting point is to consider how different ways open government initiatives communicate government information may shape citizen decisions to act and engage with government.

Hypotheses: *Linking Public Disclosure to Engagement through Reference Points*

We argue that reference points constitute an important starting point for thinking of ways in which governments can strengthen the link between public disclosure and citizen engagement, thereby improving the effectiveness of open government initiatives. As explained earlier, a reference point is a cognitive anchor that frames the way individuals compare and evaluate outcomes or choices (Mussweiler 2003; Yockey and Kruml 2009). This study focuses on reference point valence and social reference points. Reference point valence refers to positively

or negatively framing logically equivalent information (e.g., 55% chance of winning versus a 45% chance of losing). A social reference point invokes a comparison (e.g., chance of winning a hand of poker when compared to other card games). Below we explain how these different forms of reference points can shape perceived personal salience of government information and, in turn influence intentions to engage.

Hypotheses 1 and 2: Reference point valence, issue salience, and engagement intentions

Prospect theory demonstrates that the valence of reference points (loss frames versus gain frames) will vary in their impact on individual decisions. Specifically, reference points emphasizing losses are more impactful on decision-making processes than reference points conveying gains. This asymmetric response is attributable to a negativity bias in decision-making (Kahneman and Tversky 1979; Rozin and Royzman 2001). A well-known illustration of prospect theory is the Asian Disease problem posed by Tversky and Kahneman (1981), where individuals' choice between two "logically equivalent" outcomes varied according to whether the decision is framed in terms of saving lives or death (Fiegenbaum and Thomas 1988; Druckman and McDermott 2008).

In a series of influential studies, Rothman and Salovey (1997) use prospect theory to show that frames can be manipulated to systematically shape individuals' actual behaviors. They show that basis for the difference across positive and negative frames stems from perceptions of personal salience associated with the issue described in the information. Specifically, Rothman and Salovey (1997) show that negatively framed information is more effective than positively framed information at influencing individual behaviors because losses loom larger than gains.

When individuals perceive an issue as being of greater personal salience they are more likely to react because they are more concerned about how the issue in question can impact their wellbeing (Weinstein and Klein 1995). To date, the use of negatively framed reference points to pique personal salience of health information has been used to encourage members of the public to engage in a range of behaviors (for a review see Gallagher and Updergraff 2011). For example, information stressing the risks of not performing breast self-examinations (loss frame) is more effective in encouraging this behavior than information stressing the benefits (gain frame) (Meyerowitz and Chaiken 1987). Other work has shown that loss framed messages are more effective at bolstering intentions to obtain the Human Papillomavirus Vaccine than gain framed messages (Gerend and Shepherd 2007). A similar response pattern is found across a range of health related behaviors such as participation in AIDs screening (Block and Keller 1995), dental flossing (Sherman, Mann, and Updergraff 2005) and healthy eating (van Kleef, van Trijp, and Luning 2005).

All told, this body of literature establishes a foundation for two expectations:

H1: *Negatively framed government information will be more effective at piquing perceived salience of the social issue explained by the government information than positively framed data.*

When individuals perceive an issue as being of greater personal salience they are more likely to react to the issue because they are better aware of how the issue in question can impact their wellbeing (Weinstein and Klein 1995).

H2: *Individuals will be more inclined to engage with government education initiatives as their perceptions of issue salience increases.*

Hypotheses 3: When do comparative reference points matter?

A comparative reference point provides context for otherwise absolute information. In this sense comparative reference points guide individuals in their efforts to make sense of information. In this study we distinguish between two general types of comparative reference points – comparisons to groups (group comparisons) and comparisons to events (event comparisons). For example, we can compare the prevalence of one event (e.g., number of flu cases during a given flu season) across different cities (group comparison) during a given time frame. Or, we can compare the prevalence of the same event (e.g., number of flu cases during a given flu season) to the prevalence of other related events (e.g., number of Zika cases for a given period). Imposing a comparative reference point upon negatively framed information can strengthen or weaken the impact of that information on decision-making (Olsen 2015; Rothman et al. 1999; Salovey and Williams-Piehota 2004; Tversky and Kahneman 1991). As explained below, this is because imposing a comparison on negatively framed information lends meaning of otherwise abstract information (Mussweiler and Epstude 2009).

Social comparison theory (Festinger 1954) and by extension comparative optimism theory (Chambers and Windshitl 2004) are useful in thinking through the implications of group comparisons for decision-making. These theories explain that individuals underestimate the risk of a negative event affecting them when comparing themselves to other individuals or groups of individuals (Kay and Jost 2003; Rothman, Klein, and Weinstein 1996). For example, cigarette smokers typically believe they have a lower risk of contracting lung cancer when comparing themselves to other smokers, and even non-smokers (Weinstein, Marcus, and Moser 2005). This tendency results from an innate motivation to see ourselves as more exceptional than those around us – an ego justification bias (Akerlof and Dickens 1982; Festinger 1962). Because we see ourselves and the groups we belong to as exceptional, information pertaining to other groups

simply matters less – it is less salient (Hogg, Terry and White 1995). In this sense, pairing

negatively framed information (e.g., mortality rate of a disease) with a group comparison

(mortality rate in city X compared to city Y and Z) can actually result in individuals

downplaying the personal salience of the information (the danger of a disease) (Festinger 1958).

Event comparisons, on the other hand, can accentuate the effect of negatively framed

information by heightening the perceived personal salience of the information being disclosed.

Event comparisons can strengthen the effect of a piece of information because it makes the

information more 'vivid' by activating a personal emotional connection to the events in question

(Nisbett and Ross 1980)[1]. For example, comparing the mortality rate of a particular illness in a

community, to mortality rates of other types of illnesses, can draw an emotional response by

eliciting memories of family or friends afflicted by one of the illnesses listed in the comparison,

press coverage of one of the events, or personal conversations with a doctor or family member

about risks associated with these events (Goldstein and Gigerenzer 2002). In this way, the felt

proximity between ourselves and the information communicated by an event comparison is

reduced as a result of rendering data more vivid (Trope and Liberman 2010). That is, event

comparisons make information more personally salient.

> H3: *On average, the impact of a negatively framed reference point on perceptions of*
>
> *personal salience is stronger when paired with an event comparison, than it is when*
>
> *paired with a group comparison.*

Method and Data

Experimental Setting and Procedure

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[1] Information is vivid when it is " a) emotionally interesting, b) concrete and imagery-provoking, and c) proximate in a sensory, temporal, or spatial way" (Nisbett and Ross 1980,45).

To examine our hypotheses, we used a randomized survey experiment. This method is appropriate for assessing our research questions because it allows us to randomly assign participants to different combinations of reference points, thus offering causal insight into how different reference point combinations impact perceived issue salience. Put differently, randomly assigning participants to different groups allows us a greater degree of certainty that reference point combinations we are interested in are impacting perceived issue salience and not an unmeasured confounding variable. Subjects were told that there was an outbreak of a rare virus that was spreading rapidly in a community. Following this, subjects were randomly assigned to one of four treatment groups outlining the relative effects of the rare virus for those who contracted it. Treatments consisted of a graph that combined a positively or negatively framed reference point with a comparison to other viruses (event comparison) or a comparison to other cities (group comparison) to depict the severity of the virus if contracted.

To manipulate the framing of the government health information, the graph either communicated mortality rates, for the negatively framed condition, or survival rates for the positively framed condition. Rates were set such that they were logically equivalent in the sense that a 70% mortality rate corresponded to a 30% survival rate. A similar manipulation is used in Gigerenzer et al. (2007). To manipulate the comparison condition, the survival or mortality rates listed in the graph were either compared across similar cities for the group comparison condition or to other diseases and viruses for the event comparison condition. These comparisons are commonly used on state health portals to convey information about the spread of public health events such as outbreaks of the flu, Zika, or opioid overdoses.

Graphs were used to convey statistical information in our manipulations instead of numbers alone for two reasons. First, graphs are commonly used by government health portals to

communicate a range of health information to the public. As such, using graphs as opposed to numbers alone enhances the realism of the treatments. Second, graphs are also helpful in making numbers more vivid. Vividness of numbers is important because it renders data more engaging, easier to recall, and more impactful (Olsen 2017; Slovic 1987). In this case, not only are graphs more realistic, but they are also better suited to test the hypothesized effects. All graphs were modeled after those provided on state health portals that convey various health trends. Graphs are provided in appendix 1.

After exposure to their respective treatment, participants were instructed to complete the same survey.

Participants

Participants were 525 adults residing in the United States who belong to survey panels affiliated with the online survey research firm Qualtrics. Participants were invited by Qualtrics to participate in the study via email where they could follow a link leading to the stimuli and subsequent survey. Quota sampling was used to ensure that the resulting sample was representative of the general American population on parameters of gender, age, income, and education. Characteristics of the sample are shown in Table 1.

An analysis of the treatment groups revealed successful randomization in that none of the differences found across the groups with respect to the aforementioned sampling parameters was significant at the .05 level. Table 1 presents demographic characteristics of our sample. We also found that treatment groups were balanced with respect of other relevant background variables, including perceived health and how frequently participants receive flu shots ($p > .05$).

<<Table 1 about here>>

Measures of key variables

Perceived personal Salience (Mediating Variable): To assess perceived personal salience we target perceptions of personal risk related to the virus described by the government information participants were exposed to. We operationalize perceptions of personal risk according to two dimensions set out by Yang (2016): 1) the perceived likelihood of an undesirable event afflicting an individual (perceived susceptibility) and 2) the perceived magnitude of the negative event's effects (perceived severity) (Lindell 1994; Mileti and Peek 2000; Slovic 1987; 2016). When individuals perceive an event to be of greater personal risk (i.e., more susceptible to an event with severe/non-trivial implications) they are more likely to react to the event. Based upon this framework, we measure perceived susceptibility by asking participants, *"In your opinion, how great of a risk is the virus to the health of you and those you care about?"* Responses were measured using a 7-point Likert scale (1 = virus is *no risk at all*, 7 = the virus is being *extremely risky*). We measure the second dimension, perceived severity, by asking participants *"All things considered, how dangerous do you believe the virus is?"* Responses were measured using a 7-point Likert scale (1 = virus is *not serious at all*, 7 = virus is *extremely dangerous*). Principal component analysis with varimax rotation indicated a single factor was responsible for explaining 77.5% of the variation in these items.

Citizen Intentions to Engage (Outcome Variable):

Different forms of citizen engagement can be placed along a continuum, with passive forms of citizen engagement on one end and more active forms on the other (Fung 2006; Lukensmeyer and Torres 2006; Norris 2001). As mentioned earlier, an example of passive citizen engagement is citizens engaging with opportunities to learn more about how they can confront issues facing their community (Fung 2006), whereas an example of a more active form of citizen engagement would be citizens participating in coproduction initiatives (Quick and

Bryson 2016). Prior research notes that passive forms of citizen engagement, such as citizens learning more about issues confronting their community act as a gateway for more active forms of citizen engagement (Irvin and Stansbury 2004). Passive forms of engagement are those in which the engagement process is initiated by government and are characterized by unidirectional communication and consultation (Lember, Surva, and Tönurist, 2016).

Our assessment of citizen *intentions* to engage is derived from participants' engagement with an educational video pertaining to the virus created by the authors – this is a passive form of engagement. As is the case with many initiatives targeting public health issues, engaging the public in public health education initiatives constitutes the first, and most important step, in government efforts to contain the spread of outbreaks of dangerous viruses (Glanz, Rimer, and Viswanath 2008; Lefebvre and Flora 1988). The video consisted of 4 narrated PowerPoint slides, posted to YouTube by the authors and lasted roughly 90 seconds. The narration matched the material printed on the slides word for word. Participants were able to switch between the screen displaying the survey to the screen displaying the video. To measure *intentions* to engage with the educational video, participants were told that the City Government's Department of Health is asking residents to watch an educational video and that watching this video detailing virus prevention methods would greatly assist the government in its efforts to curtail the outbreak of this virus. They were then given the option to watch the video and answer some questions about the video or to skip to the next section of the survey. Participants who selected to watch the video were coded as exhibiting intentions to engage (coded 1) and those who opted not to watch the video were coded as *not* exhibiting intentions to engage (coded 0).

To gain a finer grained understanding about the effect of our treatment, we also included a series of items that measure efforts to engage with the video, among those who opt to watch the

video – a subset of the initial sample. Here, participants who agreed to watch the video were then asked to respond to 4 questions pertaining to the video they watched. As the video was presented in a separate browser window, participants were able to toggle between the video and the survey when completing the survey questions. Questions are listed in appendix 2.

Estimation Strategy

To examine the effect of reference point framing and comparisons on perceptions of personal salience, data were subjected to a 2 (positively versus negatively framed reference point) X 2 (event comparison versus group comparison) between-participants ANOVA with perceptions of personal salience as the dependent variable.

Further, the aim of this study is to examine a process as opposed to simply identifying an effect. To do so, we separate estimated effects of the treatment on the outcome variable, *intentions to engage*, into two components – an estimate of the indirect effect, which represents a particular mechanism of interest to the study, and an estimate of the direct effect, which represents all alternative pathways a treatment may affect an outcome. We use the potential outcomes approach to estimate indirect effects proposed by Imai and colleagues (Imai, Keele, and Yamamoto 2010; Imai et al. 2011; Imai, Tingley and Yamamoto 2013). This approach uses a counterfactual framework originally proposed by Rubin (1974) to offer insight into what the outcome variable would look like at values of the mediator that are not directly observed (for an explanation see Imai, Keele, and Yamamoto 2010).

Within the context of a single experiment design, we are uncertain whether or not a third unobserved variable correlated with the mediator and outcome variables is biasing our estimates of the indirect effect (a violation of the sequential ignorability assumption). For this reason,

sensitivity tests are used (Imai, Keele, Yamamoto 2010; VanderWeele 2010). The sensitivity parameter examines how the size and significance of indirect and direct effects vary as a function of the correlation between the error terms of the (two) structural equations used to obtain values of the mediator and outcome variables.

Results

Table 2 provides descriptive statistics for participants' perceptions of the personal salience of the information and engagement intentions by treatment group.

<<Table 2 about here>>

Turning to our findings, as predicted, those assigned to the graph using negatively the framed reference point (mortality rate) viewed the virus as being a greater personal salience than those assigned to the graph using a positively framed reference point (survival rate) $(F(1, 521) = 7.56, p = .006)$. That is, the negatively framed reference point rendered the information more salient than the positively framed reference point. Specifically, on a 7 point Liker scale, the mean value for perceived personal salience among those assigned to the negatively framed reference point treatment ($M = 5.80$, SD $= 1.20$) was .40 points higher than the mean value for those assigned to the positively framed reference point treatment ($M = 5.40$, SD $= 1.34$). The partial eta squared value, 0.14, indicates a moderate effect of the treatment on perceived personal salience. In line with our hypothesis, *this indicates the negatively framed condition was more effective at enhancing perceptions of personal salience of the government information than the positively framed condition.*

<<Table 3 about here>>

We also find that the effect of framing on perceptions of personal salience varies according to the comparison it is paired with, though this effect is marginally significant ($F(1, 521) = 3.21, p = .074$). Specifically, when we pair negatively framed information with an event

comparison (i.e., comparison to other public health risks), we observe a significant and negative simple effect on perceptions of personal salience (B = -0.198, SE = .062, *CI95%: -.320, -.075, p* = .002). However, when we pair negatively framed information with a group comparison (i.e., comparison to other cities) the effect of the negatively framed information on perceived personal salience was not statistically significant (*B* = -.041, SE = .063, CI95%: -.165, .082, *p* = .506). Figure 2 illustrates the differences between treatment groups graphically. *Thus, our findings indicate that the influence of negatively framed information will vary according to the type of comparison employed.*

The results of the ANOVA analysis are summarized in appendix 2.

<<Figure 2 about here>>

We find evidence of a positive relationship between perceptions of personal salience and participant engagement intentions (*B* = .272, *SE* = .092, *Wald* = 8.78, *Exp(B)* = 1.31, *p* = .003). *Namely, the greater the perceived personal salience of the information, the stronger participant intentions to collaborate with government.* These results offer support for our second hypothesis.

Given our first two hypotheses, we also test for the presence of an indirect effect of information framing on intentions to engage. Further, in keeping with hypothesis three, we want to know whether this indirect effect varies according to whether a negative reference point is paired with a group versus an event comparison. Put differently, we test for a conditional indirect effect. Table 3 presents the results of test for a conditional indirect effect.

As is shown in table 3, our findings offer evidence of a conditional indirect effect of negatively framed information on engagement – we find evidence of an indirect effect when we combine negatively framed government information with an event comparison, but not when we combine the negatively framed information with a group comparison. Further, the coefficient of

the indirect effect under the event comparison condition is negative. *This means that, under the event comparison condition, the shift from the positively framed reference point (survival rates) to the negatively framed reference point (mortality rates) piqued participant perceptions of personal salience, which in turn increased intentions to engage with the government educational initiative.*

We would also like to know whether the variation in the size of the indirect effects across the event comparison condition and city comparison condition is statistically significant. Therefore, we test for moderated mediation. The index of moderated mediation, which is calculated by subtracting the indirect effect under the event comparison condition from the indirect effect under the group comparison condition, is .04. The 95% confidence interval surrounding this value does not include zero (CI95%: .001, .128). *This means that the difference in indirect effects under the group comparison condition and event comparison conditions is statistically significant (p < .05). These findings support our third and final hypothesis.*

Additionally, the sensitivity factor for the indirect effect for the event comparison condition (ρ) is .2. This indicates that the indirect effect would disappear if a single confounding variable existed that explained 20% of the variation in both the mediating and outcome variables (see Imai et al. 2011, or Keele, Tingley, and Yamamoto 2015).

<div align="center">**<<Table 4 about here>>**</div>

Finally, for the 63.8% of the sample that chose to watch the video, we also want to know the extent to which the treatments impact the attention participants paid to the information communicated to them in the video. As reported in table 4, we find no significant differences in mean correct responses across the four treatment groups – out of 4 questions, participants correctly responded to roughly 3 questions. An assessment of wrong answers reveals no discernable patterns. This finding indicates those who opted to engage and watch the video,

irrespective of the treatment groups they were assigned to, on average obtained a similar level of knowledge regarding the virus described in the prompt and video and exerted similar amounts of effort.

Limitations

Cumulatively, our findings offer novel insight into factors that shape the effectiveness of open government initiatives. However, before discussing implications of this research for theory and practice, it is helpful to first overview some limitations. As with most survey experiments, our study relies on the use of hypothetical scenarios as a means of manipulating participant attitudes and behaviors. While efforts were made to enhance the realism of our treatments, the extent to which the attitudes and behaviors observed within the context of this experiment will approximate attitudes and behaviors in real life is not entirely clear. That said, these results constitute an important foundation for more applied research designs to build upon. A second point here pertains to the potential gap between stated intentions to engage and actual engagement. In this study, we measure engagement with an educational video in a context that is removed from real life. To this end, caution must be exercised when discussing implications of our findings for actual citizen engagement. That said, as mentioned above these findings do establish a foundation for future research on open government that draws on more applied research designs.

Conclusion

What do these findings mean for open government research on the link open transparency to citizen engagement? First, they offer good news for open government optimists in that they offer evidence of a positive relationship between transparency and engagement. Indeed, as we demonstrate, exposure to state health information increased participant intentions to engage by

piquing perceptions of personal salience. These findings complement the existing structural perspective on open government effectiveness (e.g., McDermott 2010; Attard et al. 2015; Dawes, Vidiasova, and Parkhimovich 2017) by offering insight into how to deliver government information in ways that resonate with and engage intended audiences. At the same time, when we do account for human behavior, we find a conditional nature to the relationship between transparency and engagement, which may help explain why, despite numerous efforts to render government more open, there is mixed evidence of such initiatives resulting in a more informed or engaged population (Evans and Campos 2013). Our findings contribute to theory by suggesting that this transformation is not occurring not because open government is incapable of effectuating greater coproduction, but rather because governments may not be using this tool in ways that are capable of eliciting intended outcomes – we are focusing too much on the technologies and not enough on people.

Second, our findings offer practical insight into straightforward ways of rendering open government more effective in stimulating citizen engagement by considering different aspects of data visualization, such as the choice of reference points – comparisons are important. Indeed, as we demonstrate, simply modifying the type of comparison used to communicate the spread of the *Adono Virus* resulted in substantial differences in participants' engagement in public health initiatives. At the same time, while we find event comparisons to be effective in conveying personal salience of information and triggering citizen engagement, this finding also points to the possibility that additional forms of comparison to be identified in future research may also play an important role in communicating the importance of government information. Thus, a key point here is that strategies for enhancing the effectiveness of open government may trace back to straightforward questions over effective communication.

The success of open government requires a combination of complementary tools used to communicate and collaborate with citizens. However, the linkage between approaches and tools used to communicate information and those used to engage and collaborate has been under-researched. We show, using the domain of public health as an example, that simple modifications to the presentation of health-related information can have substantive implications for the success of open government initiatives, in that such modifications shape the interplay between transparency and citizen engagement. Yet, just as we demonstrate that collaboration can be triggered through relatively minor revisions to the way information is framed, we must also acknowledge that this relationship between communication and collaboration is a fragile one.

Table 1: Descriptive Statistics

	Negative X Event (n = 161)	Positive X Group (n = 127)	Positive X Event (n = 115)	Negative X Group (n = 121)
Gender (%)				
Female	49.6	44.9	60	55.4
Education (%)				
High school or less	21	15.7	20	11.6
Some college	17.9	18.9	27.8	26.4
Associates degree	11.7	12.6	9.6	10.7
Bachelor's degree	32.7	33.1	30.4	25.6
Graduate degree	16.7	19.7	12.2	25.6
Mean Age (SD)	49.07 (17.4)	45.75 (15.77)	43.32 (16.07)	45.52 (15.41)
Household Income (%)				
>$ 30,000	15.4	14.2	18.3	9.1
$30,000 – 44,999	20.4	12.6	20.9	19.8
$45,000 – 59,999	16	15.7	15.7	18.2
$60,000 - 74,999	11.7	16.5	13.9	10.7
$75,000 - 89,999	10.5	10.2	8.7	4.1
$90,000 - 104, 999	9.3	5.5	8.7	10.7
$105,000+	16.7	25.2	13.9	27.3

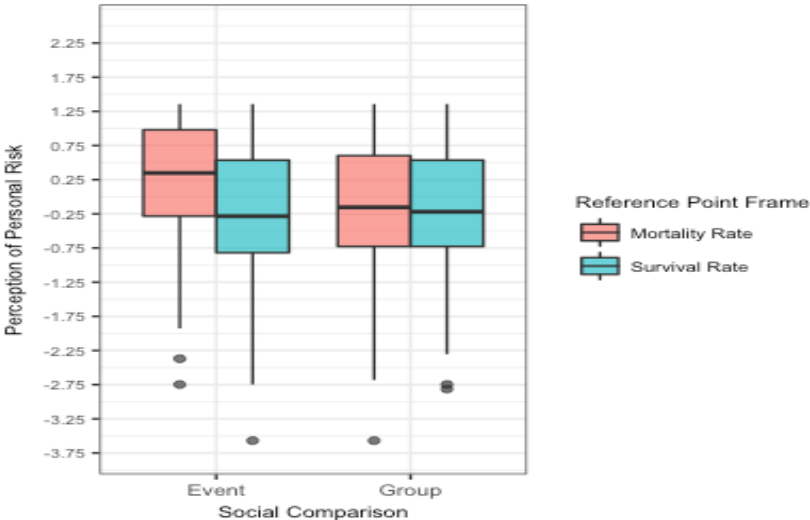**Table 2: Descriptive statistics for mediator and outcome variables by treatment condition**

Condition		N	Minimum	Maximum	Mean	Std. Deviation
Negative / Event	Salience	162	0	7	5.6142	1.15328
	Engagement intention	162	0	1	.67	.473
Positive / Group	Salience	127	0	7	5.18	1.19
	Engagement intention	127	0	1	.65	.478
Positive / Event	Salience	115	0	7	5.13	1.30
	Engagement intention	115	0	1	.63	.484
Negative / Group	Salience	121	0		5.2645	1.22317
	Engagement intention	121	0	1	.59	.494

Table 3. Conditional indirect (mediated) and direct effects of reference point framing on intention to engage (H2 and H3)

	Potential Outcomes Estimates					
	Event Comparison			Group Comparison		
	Estimate	95% CI	P-value	Estimate	95% CI	P-value
Mediation Effect	-0.012	-0.024, -0.003	0.000	-0.002	-0.011, 0.005	0.59
Direct Effect	0.014	-0.027, 0.056	0.481	0.01488	-0.027, 0.056	0.46
Total Effect	0.003	-0.039, 0.045	0.889	0.0129	-0.029, 0.055	0.53
N	277			248		

Bias corrected 95% bootstrap confidence intervals based on 5000 simulations. Dependent variable: 1(engage), 0 (opt out).

Figure 2: Perceptions of Personal Salience by Treatment Group (H1)

The dependent variable, perceptions of personal salience, is standardized.

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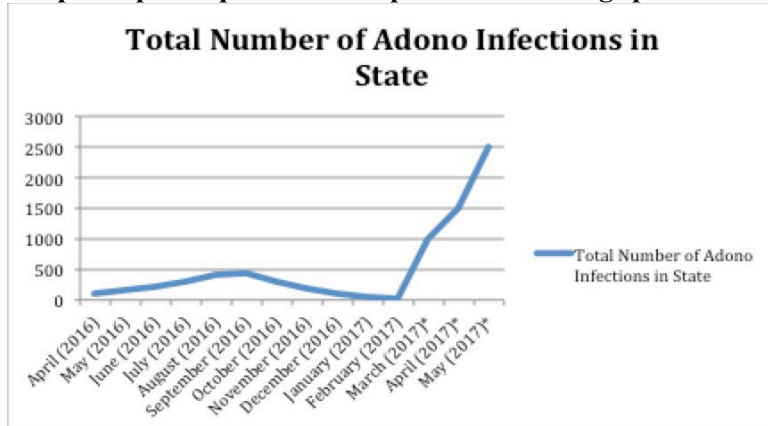
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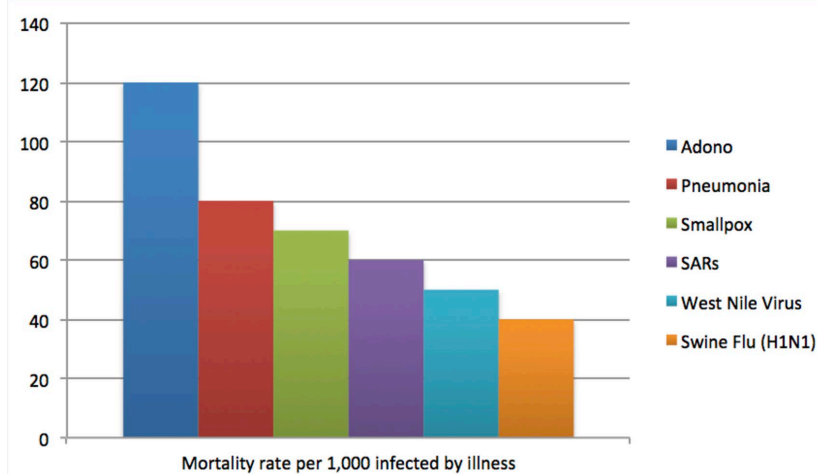
Agenda: Guest Editors' Introduction. *Journal of Theoretical and Applied Electronic Commerce Research* 9 (2). DOI: 10.4067/S0718-18762014000200001
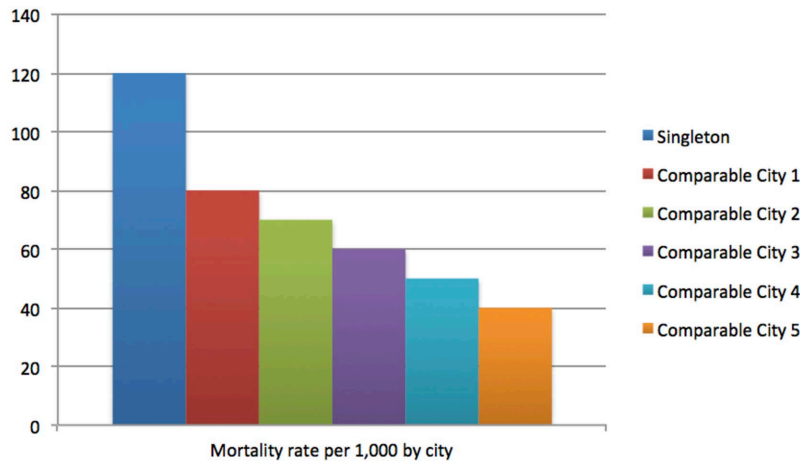
Appendix 1: Stimuli

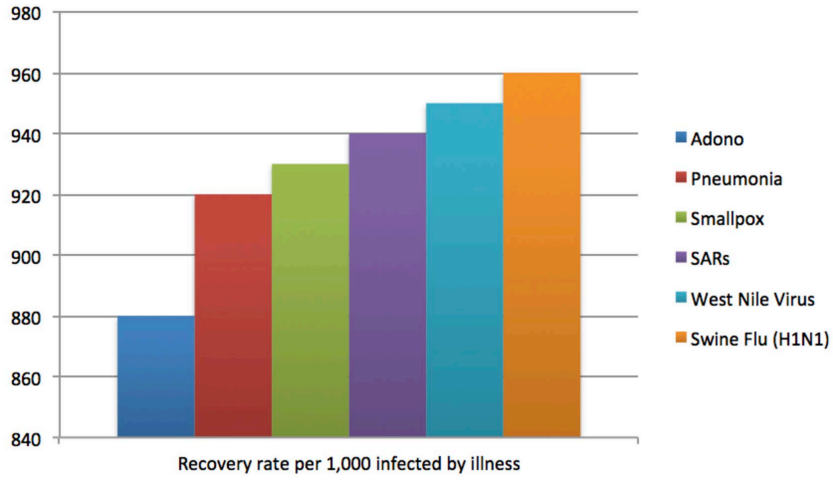**Graph all participants were exposed to outlining spread of Adono**

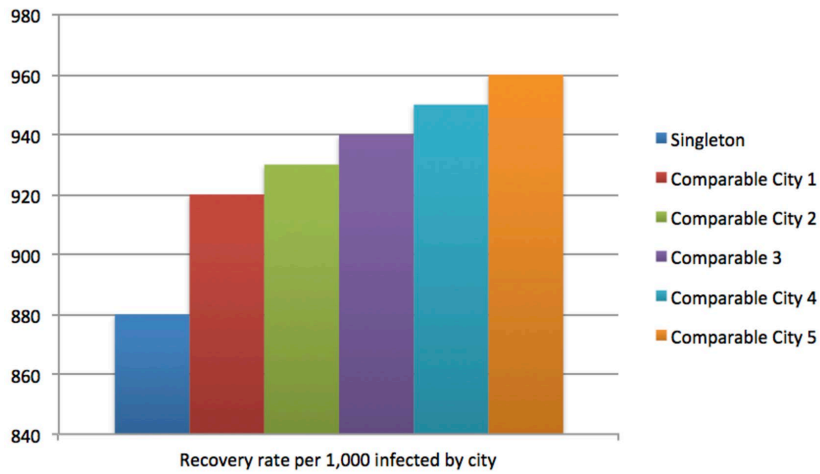**Treatment: Negative X Historic Reference Point**

Treatment: Negative X Social Reference Point

Treatment: Positive X Historic Reference Point

Recovery rate per 1,000 infected by illness

Legend:
- Adono
- Pneumonia
- Smallpox
- SARs
- West Nile Virus
- Swine Flu (H1N1)

Treatment: Positive X Social Reference Point

Recovery rate per 1,000 infected by city

Legend:
- Singleton
- Comparable City 1
- Comparable City 2
- Comparable 3
- Comparable City 4
- Comparable City 5

Appendix 2:

Tests of Between-Subjects Effects
Dependent Variable: Perceived Personal Salience of Adono Virus

Source	Type III Sum of Squares	df	F	Sig.	Partial Eta Squared
Corrected Model	14.25	3	4.86	.002	.027
Intercept	.220	1	.225	.635	.000
Framing	7.39	1	7.56	.006	.014
Comparison	1.99	1	2.04	.154	.004
Framing * Comparison	3.14	1	3.21	.074	.006
Error	509.74	521			
Total	524	525			
Corrected Total	524	524			

R Squared = .027 (Adjusted R Squared = .022 Dependent variable is standardized)