

## **“Airpocalypse” and the China Smog Crisis: Examining Online and Offline Civic Engagement Motives, Attention, and Actions**

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Air pollution is a leading concern in China, linked to one in three deaths. Given the rising prominence and importance of environmental protection in China and worldwide, this study investigates civic engagement related to air pollution by examining the associations between social network site (SNS) use, attention to the China smog crisis-related content on mobile Internet platforms, and motives for SNSs use. Results revealed that attention to the China smog crisis-related content on mobile Internet platforms was positively associated with participation in the China smog crisis, both on SNSs and on the ground. The combination of having a high need for recognition along with a low need for entertainment best predicted civic engagement, both on SNSs and offline. Furthermore, results indicated the importance of differentiating geography in the context of Chinese communication practices, as smogginess of location moderated the relationship between offline civic engagement and attitude toward SNS use.

*Keywords: civic engagement, China smog crisis, media exposure, social network sites, mobile Internet, uses and gratifications*

In light of mounting concerns over climate change in China and worldwide, this study augments understanding of online and offline civic engagement related to air pollution by examining the associations between social network site (SNS) use, attention to the China smog crisis-related content on mobile Internet platforms, and motives for SNS use. These communication associations are significant because rising use of the Internet and SNSs in recent years has facilitated participation in pressing social and political issues (Cheng, Liang, & Leung, 2014; L. Zhang & Pentina, 2012), including air pollution or what has been termed the *airpocalypse* or *airmageddon* by Chinese Internet users (Kaiman, 2013).

From 2014 to 2016, the number of SNS users of China increased from 453 million to 514 million (Statista, 2017b). Nearly 85% of SNS users obtained access through mobile devices (Kantar, 2015). As of August 2015, WeChat (a WhatsApp-like messaging app), Q-Zone, and Weibo (a microblogging site) became the three most frequently used SNSs in China (Statista, 2017b). The average Chinese Internet user, who is

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between 16 and 30 years of age, spends almost 28 hours per week on mobile Internet platforms (eMarketer, 2015). Consuming video/audio content, instant messaging, and sharing and forwarding information were the top-three leading activities among SNS users in China (Statista, 2017a).

More important, commentators have noted that the uses of SNSs have fostered stronger civic engagement practices within China as digital technologies provide alternative and more diverse ways for Chinese nationals to participate in social and political issues (Bondes & Schucher, 2014). Digital applications have promoted participation in civic life by establishing connections between citizens across different areas; allowing like-minded individuals to debate issues of common concerns; reducing cost and effort of information sharing; and increasing the amount and diversity of information and the speed of meme circulation (Cheong & Chen, 2015; Esarey & Qiang, 2011; Kaufhold, Valenzuela, & Gil de Zúñiga, 2010). For example, more than 10 million Chinese nationals engaged in the Wenzhou train collision incident online by discussing and sharing information; commenting on social justice, corruption, and other contentious issues that are associated with the rapid development of China's economy; and venting discontentment with government institutions (Bondes & Schucher, 2014; Hassid, 2012).

Although there has been a marked increase in research investigating the influence of uses of Internet and SNSs on civic and political engagement, there is limited research examining the connections between online and offline civic engagement in authoritarian regimes such as China. Air pollution, which is a major environmental issue facing China and beyond, provides a timely and significant window for understanding offline and online civic engagement among Chinese nationals. The leading form of air pollution is smog. Coal combustion, motor vehicles, industrial production, and dust are four primary sources of particulate matter (PM) and generate considerable amounts of smog (Bai, 2015). The particulate pollution does not only lead to low visibility, but also brings about severe breathing and health problems. According to the latest research, air pollution is identified as the likely cause of one in three deaths in China, making daily life as harmful as smoking cigarettes (Solomon, 2016). As a response, the Chinese government has declared "war" on air pollution ("What Is China," 2016). Multiple cities in northern China have issued "red alerts," which has prompted a succession of regulations and preventive measures, such as ordering schools and kindergartens to cancel their classes, closing highways, and banning high-emission vehicles from driving on roads (McLaughlin, 2016; Merchant & Zhang, 2016).

At the same time, Chinese residents in affected regions have actively engaged in dealing with air pollution, both online and on the ground. Some Chinese citizens have participated in a number of online as well as face-to-face activities initiated and coordinated by environmental nongovernmental organizations in major cities of China (Xu, 2014). The face-to-face activities have included lectures on pollution data, air-testing trips, fundraising events, vegetable shopping trips, and other "informal and diffused" forms of collective action (Xu, 2014, p. 1374). Through SNSs, citizens have obtained updates of air quality logs, donated money to environmental nongovernmental organizations, discussed air pollution data, and expressed concerns about the issues (Xu, 2014). Lay Chinese nationals have also used SNSs such as Weibo and WeChat as channels for venting their frustrations and outrage, voicing their fear and hopelessness, and criticizing the authorities (Boykoff & Hu, 2016). In this sense, Internet use potentially "foster[s] a citizenry that is increasingly knowledgeable about public policy issues and collective problems and promote[s] civic participation and public deliberation" within China (Zhou, 2009, p. 1005).

Drawing on theories of civic and political engagement, media attention, and uses and gratifications, we sought to increase understanding of online and offline civic engagement related to air pollution by examining its relationships with SNS use, attention to the China smog crisis-related content on mobile Internet platforms, and motives for SNS use. Findings of the study provide a framework to comprehend civic participation related to environmental issues and offer insights into the role of communication technologies including SNSs and mobile Internet platforms for fueling civic life and new democratic processes in China and similar contexts.

### **Literature Review**

Civic engagement or the "ways in which citizens participate in the life of community in order to improve conditions for others or to help shape the community's future" influences socioeconomic development and enhances responsiveness and accountability of governments (Adler & Goggin, 2005, p. 236). Here, civic engagement is conceptualized as "voluntary civic activity," which is (1) neither "mandatory" nor "financially compensated," (2) "aimed at addressing social and/or community issues that are not political by nature" via "nongovernmental or nonelectoral means," (3) and "conducive to the collective well-being" (Gil de Zúñiga & Valenzuela, 2011, p. 399).

As the Internet is increasingly used as a tool for communicating and organizing collective and connective actions, civic engagement online has become a key criterion variable in communication research (Bennett & Segerberg, 2012; Hsieh & Li, 2014). Prior empirical investigations have largely focused on corporeal forms of civic engagement, such as "attending church, volunteering for nonpolitical groups, raising money for charities, participating in neighborhood meetings, supporting the social responsibility of a corporation by buying its product or services, working on behalf of a social group or cause" (Gil de Zúñiga & Valenzuela, 2011, p. 399). Various online communication tools supplement and alter traditional forms of civic engagement (Cheng et al., 2014). SNS use, for instance, enables ordinary citizens to participate in civic life as they search for information, express personal opinions, share news, discuss public affairs, join online civic communities, and donate money online (Cheng et al., 2014; Vitak et al., 2011).

#### ***Civic Engagement, Internet Use, and Attention to Civic Issues***

Previous studies have highlighted significant connections between uses of digital media and civic participation as features such as "affordability, freely available information, anonymity, customizability, time- and distance-defying communication, interactivity, and decentralization" (Zhou, 2009, p. 1005) help facilitate political engagement worldwide. For instance, in the wake of the Arab Spring, Twitter was employed by activists, mainstream media outlets, and journalists to produce and disseminate news, both domestically and internationally (Lotan et al., 2011). In recent years, millions of nongovernmental organizations in China have engaged a repertoire of communication technologies to galvanize civic participation (Cheong & Yang, 2017), including the use of social media to connect with their stakeholders by posting news links, press releases, campaign summaries, photos, and video files (Lo & Waters, 2012).

Yet, the literature concerning the role of the Internet in civic engagement is "divided" (de Vreese & Boomgaarden, 2006, p. 317), with considerable debate on the implications of online activities for offline civic

actions. On the one hand, some scholars have contended that Web-based services facilitate civic engagement and thus enhance "civil society and democratic politics" (e.g., Jennings & Zeitner, 2003, p. 312), an association that may be especially valued in authoritarian regimes. As interlinked networks of communication permit rapid and global circulations, online civic activities can circumvent state censorship (Castells, 2009; MacKinnon, 2008). Moreover, the online network structures bridge connections between users of different socioeconomic groups (boyd & Ellison, 2007; Klinger & Svensson, 2014) and offer like-minded citizens opportunities to speak and be connected across geography (Bennett & Segerberg, 2012; Esarey & Qiang, 2011).

On the other hand, some scholars have argued that Internet use for civic purposes is not a significant predictor for on-ground engagement (Dimitrova & Bystrom, 2013; Scheufele & Nisbet, 2002; Theocharis & Quintelier, 2016). A study among 6,330 Belgian youths found that time spent online did not significantly predict participation in public life, after gender, socioeconomic, and ethnic backgrounds were controlled for (Quintelier & Vissers, 2008). Scholars have also contended that the associations between Internet use and participation in civic or political life depend on context, as online connections "will mainly serve to perpetuate and reinforce existing inequalities in civic engagement," in part because of the "digital divide" (Jennings & Zeitner, 2003, p. 312). In the West and other developed countries, digital technologies may be simply another tool for obtaining information, connecting with members of social networks and other purposes by individuals who have sufficient resources, skills, motivation, and interests (Min, 2010; van Deursen & van Dijk, 2011).

Furthermore, the content of media use is another factor that influences participation in civic and political life as earlier research on attention to news on television and newspapers does not only contribute to an increase in knowledge about social and political issues, but also affects civic engagement (e.g., Shah, McLeod, & Yoon, 2001). The relationship between attention to traditional media news and civic or political engagement can be extended to attention to news content online. Drawing on U.S. national data, Gil de Zúñiga, Jung, and Valenzuela (2012) found that SNS use for news is a positive predictor of civic participation. Kim, Hsu, and Gil de Zúñiga (2013) also noted that the use of SNSs and microblogging for obtaining news has a positive connection with civic engagement. Likewise, attention to the China smog crisis-related content on mobile Internet platforms might keep users informed of most recent air quality developments, ways of protecting themselves from smog, things they can do to mitigate air pollution, and the like. Attention to these news stories is helpful for the users to understand why and how they need to engage with or ameliorate the China smog crisis.

Taken together, given that prior research consistently suggests that attention to news and information about public affairs or political issues contributes to an increase in participation in civic and political life, we proposed the following hypotheses in this study:

- H1: Civic engagement on SNSs is positively associated with attention to content about the China smog crisis on mobile Internet platforms.*
- H2: Offline civic engagement is positively associated with attention to content about the China smog crisis on mobile Internet platforms.*

Previous research highlights the association between general SNS use and civic or political engagement (Chan, Wu, Hao, Xi, & Jin, 2012; Cheng et al., 2014). For example, Cheng et al. (2014) argue that both frequency of SNS use on mobile devices and amount of posting on SNSs are positively associated with civic engagement within China. Chan et al. (2012) also found that intensity of microblog use significantly predicts willingness to express opinions about government and politics. Therefore, we speculated that intensity of SNS use and civic engagement related to the China smog crisis would be related in some way. In this study, the intensity of SNS use was conceptualized as a combination of amount of time spent on SNSs and attitude toward SNS use in daily life (Ellison, Steinfield, & Lampe, 2007).

### ***Civic Engagement and Motives for SNS Use***

The uses and gratifications theory is based primarily on the assumption that users actively choose media to satisfy their individual needs (Blumer & Katz, 1974). This theory also suggests that media effects on users' thoughts, emotions, or behavior depend on several variables, such as users' level of involvement with a particular medium, motives for media use, and social factors (Rubin, 1984; Rubin & Perse, 1987; Rubin & Windahl, 1986). Adopting the uses and gratifications theory, researchers have examined motives for media use, namely how and why individuals use a particular medium (e.g., Papacharissi & Rubin, 2000). The motives mainly involve information exchange, social interaction, and recreation (e.g., Cheng et al., 2014; Shah, Kwak, & Holbert, 2001).

Pertinent to the purposes of this study, results from prior empirical research studies have highlighted varying connections between motives for media use and participation in civic or political life, including those studies grounded in China (Chan et al., 2012; Cheng et al., 2014; L. Zhang & Pentina, 2012). Specifically, prior studies have established a significant and positive connection between media use for cognition needs and citizen engagement (e.g., Campbell & Kwak, 2010; Park, Kee, & Valenzuela, 2009). For instance, Shah, McLeod, & Yoon, 2001) found that Internet use for information exchange is positively associated with civic engagement. Gil de Zúñiga et al. (2012) note that SNS use for news both directly and indirectly promotes civic participation. In addition, Chan et al. (2012) found that microblog use for gratifying information needs is positively associated with online expressions related to politics in China.

Drawing on the fairly consistent and positive relationship between media use for informational purposes and civic engagement, we proposed the following hypotheses:

*H3: Civic engagement on SNSs is positively associated with SNS use for cognition needs.*

*H4: Offline civic engagement is positively associated with SNS use for cognition needs.*

In addition, prior studies have demonstrated that media use for gratifying social interaction, particularly for recognition and affection needs, is related to civic engagement, although the relations vary by contexts (e.g., Cheng et al., 2014). Hsieh and Li (2014), for instance, contend that online media use for social interaction contributes to higher levels of direct contact with political figures and expression of political thoughts online, even after the relationship between political participation and psychological and behavioral antecedents is controlled. Furthermore, Cheng et al. (2014) found support for their proposition that SNS

use on mobile devices for recognition needs significantly predicts civic engagement. At the same time, SNS use on mobile devices for affection is positively correlated with civic engagement. However, Campbell and Kwak (2010) claim that mobile phone use for sociability does not significantly predict civic engagement or political engagement. Likewise, X. Zhang and Lin (2014) maintain that SNS use for social networking among college students is not associated with the level of political discussion one has with friends and participation in China's central government-initiated activities.

In terms of media use for entertainment on civic and political engagement, some contradictory findings also exist. Chan et al. (2012) and Cheng et al. (2014) argue that microblog use for entertainment needs is not significantly associated with online expression about government and political affairs. Yet, in spite of these insignificant relationships, Campbell and Kwak (2010) found that mobile phone use for personal recreation is positively associated with political participation. On the contrary, Shah, McLeod, and Yoon (2001) found that Internet use for social recreation is negatively associated with participation in civic activities.

Thus, given that prior studies have revealed inconsistent associations between civic engagement and media use for social interaction and entertainment, further investigations of these relationships will augment understanding of communication practices that undergird Chinese civic engagement. In this study, we were interested in exploring how SNS use for social interaction, particularly for affection and recognition needs (Cheng et al., 2014), and SNS use for entertainment are associated with civic engagement related to the China smog crisis. Therefore, we asked

*RQ1: Is civic engagement on SNSs associated with SNS use for (a) affection needs, (b) recognition needs, or (c) entertainment?*

*RQ2: Is offline civic engagement associated with SNS use for (a) affection needs, (b) recognition needs, or (c) entertainment?*

### **Method**

The pilot study and data collection procedures were conducted from September to December 2016.

### **Sample**

Participants for this study were recruited via snowball sampling through specific faculty and staff members of universities and vocational colleges of China and employees of multiple companies located in China. All participants contacted by the researchers received the following items through e-mail or SNSs: (1) a quick response code of the questionnaire hosted on <http://www.qualtrics.com>, (2) an anonymous link to the online questionnaire, and (3) a recruitment script of this study. In total, 718 responses were recorded by <http://www.qualtrics.com>.

In the final sample, participants ( $N = 686$ ) included 389 women (56.71%) and 297 men (43.29%). The mean age was 28.51 years ( $SD = 10.03$ , range = 1–60 years).<sup>1</sup> For monthly household income in renminbi (RMB), the official currency of China, 15.33% of participants reported less than 3,000 RMB, 26.51% reported between 3,001 RMB and 6,000 RMB, 19.63% reported between 6,001 RMB and 9,000 RMB, 14.33% reported between 9,001 RMB and 12,000 RMB, 7.16% reported between 12,001 RMB and 15,000 RMB, 4.58% reported between 15,001 RMB and 18,000 RMB, and 12.46% reported more than 18,000 RMB. For the highest level of education attained, 0.29% of participants reported primary school and below, 3.59% reported junior high school, 9.20% reported having a senior or vocational high school diploma, 20.26% reported having an associate's degree, 52.16% reported having a bachelor's degree, 13.51% reported having a master's degree, and 0.99% reported having a doctoral degree. For geographic location, 14.49% of participants reported that they were working or residing in one of the cities or provinces: Beijing, Henan, Hebei, Tianjin, or Shandong; 7.60% reported Hubei, Jiangsu, Shanxi, Anhui, or Chongqing; 6.31% reported Liaoning, Jilin, Shanghai, Xinjiang, or Hunan; 58.11% reported Shannxi, Sichuan, Zhejiang, Ningxia, or Jiangxi; 2.44% reported Qinghai, Gansu, Inner Mongolia, Heilongjiang, or Guangxi; 10.76% reported Guangdong, Guizhou, Fujian, Yunnan, or Tibet; and 0.29% reported Hainan. Given the use of snowball sampling, some sample characteristics of this study did not precisely reflect characteristics of the population of China (National Bureau of Statistics of China, 2016; Statista, 2018). Specifically, the sample consisted of respondents with a lower median age ( $Mdn = 27$  years) compared with the national populace ( $Mdn = 37$  years). Two thirds of the sample reported having earned a bachelor's degree or above, compared with less than 10% in the general population of China attaining the same educational level. The sample also had a slightly higher percentage of females (56.71%) than that of population of China (49.0%).

### ***Pilot Study***

To develop the research instruments, we conducted 21 in-depth interviews among Chinese nationals who were residing, working, or studying in Mainland China to identify the most relevant modes of online and offline civic engagement related to the China smog crisis. Some instruments of the questionnaire were designed based on the analyses of the interviews. To test the adequacy of the research instruments, we pilot tested the questionnaire (van Teijlingen & Hundley, 2001) among the target population of Chinese adult Internet users. The pilot study involved 63 Chinese nationals who were SNS users aged 18 and older. In addition, two Chinese doctoral students and one employee working at a technology company in China offered feedback on the questionnaire. Based on the results from the pilot survey and feedback, we refined the original questionnaire to improve the adequacy of the research instruments.

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<sup>1</sup> The youngest age in the range, according to the self-report data, is 1 (the result from the descriptive analysis of the age variable), although at the beginning of our survey we noted that individuals at least 18 years old are eligible to participate in this study. Participants were asked to type their age in a text box.

## **Measurements**

### *Predictor Variables*

*Demographics.* Gender was measured on a nominal scale (1 = *male*, 2 = *female*). Age was measured by asking participants to answer, "What is your age on your last birthday?" (Gil de Zúñiga et al., 2012, p. 324). Education was operationalized by asking participants to choose one of seven categories of the highest level of education attained (1 = *primary school or below*, 7 = *doctoral degree*). For income, participants chose one of seven categories of total monthly household income in RMB (1 = *less than 3,000 RMB*, 7 = *more than 18,001 RMB*; X. Zhang & Lin, 2014).

*Smogginess of location.* Location smogginess was operationalized by provinces, municipalities, and autonomous regions of Mainland China that have been ranked by Greenpeace (2016) according to their annual average concentration of PM<sub>2.5</sub> in 2015. According to the United States Environmental Protection Agency (n.d.), PM<sub>2.5</sub> refers to "inhalable particles, with diameters that are generally 2.5 micrometers and smaller" (para. 4). In this study, participants were asked to choose one from seven categories of provinces (or cities) of China where they are currently studying, working, or residing.<sup>2</sup> The provinces, municipalities, and autonomous regions were categorized according to their air pollution levels, with 1 referring those with the highest average concentration of PM<sub>2.5</sub>, and 7 referring to those with the lowest average concentration of PM<sub>2.5</sub> (Greenpeace, 2016).

*SNS use intensity.* SNS use intensity was measured through two dimensions: (1) average time spent on SNSs per day in the past week, and (2) the attitude toward SNS use in daily life. In the present study, the scale measuring Facebook use intensity developed by Ellison et al. (2007) was adapted for measuring SNS use intensity. First, participants were asked, "In the past week, approximately how much time per day have you spent actively using SNS?" with a slider (min = 0 minutes, max = 240 minutes). Second, participants were asked to rate their attitude toward SNS use in daily life on six items on 7-point Likert scales (1 = *strongly disagree*, 7 = *strongly agree*), including "SNS is part of my everyday activity," "I am proud to tell people I am on SNS," "SNS has become part of my daily routine," "I feel out of touch when I have not logged onto SNS for a while," "I feel I am part of the SNS community," and "I would be sorry if SNS shut down" ( $M = 5.60$ ,  $SD = 1.12$ , Cronbach's  $\alpha = .88$ ).

*Attention to civic issues.* Attention to civic issues was operationalized as the frequency of viewing China's smog crisis-related content on the mobile Internet. This variable was measured by an additive scale of eight items adapted from a scale measuring attention to public affairs on TV developed by W. Zhang and Chia (2006). Participants were asked, "In the past year, approximately how much attention have you paid to the China smog crisis-related content on mobile Internet?" on 7-point Likert scales (1 = *never*, 7 = *I paid attention to this particular content every time when I used mobile Internet*).

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<sup>2</sup> 1 = Beijing, Henan, Hebei, Tianjin, and Shandong; 2 = Hubei, Jiangsu, Shanxi, Anhui, and Chongqing; 3 = Liaoning, Jilin, Shanghai, Xinjiang, and Hunan; 4 = Shannxi, Zhejiang, Sichuan, Ningxia, and Jiangxi; 5 = Qinghai, Gansu, Inner Mongolia, Heilongjiang, and Guangxi; 6 = Guangdong, Guizhou, Fujian, Yunnan, and Tibet; 7 = Hainan.



The contents included (1) the air quality index, (2) smog alerts, (3) causes of smog, (4) areas affected by smog, (5) duration of smog, (6) harmful effects of smog on health, (7) policies and actions the government has carried out for solving the smog issue, and (8) preventive measures for smog ( $M = 3.81$ ,  $SD = 1.60$ , Cronbach's  $\alpha = .94$ ).

*Motives for SNS use.* Motives for SNS use were measured by 7-point Likert scales (1 = *strongly disagree*, 7 = *strongly agree*) adapted from Cheng and colleagues' (2014) scales that have been used for assessing the motives for SNS use among Chinese nationals. SNS use for cognition needs was measured by asking participants to indicate their level of agreement with four items: "to broaden knowledge base," "to understand events happening," "to find out what is going on in society," and "to refine my thinking" ( $M = 5.56$ ,  $SD = 1.04$ , Cronbach's  $\alpha = .91$ ). SNS use for social interaction was measured through two dimensions: SNS use for affection and recognition needs. Affection needs included four items: "to let others know I care for them," "to get the feeling that people care about me," "to share common topics with friends," and "to share position, opinion, and personal values" ( $M = 5.09$ ,  $SD = 1.12$ , Cronbach's  $\alpha = .86$ ). Recognition needs included three items: "to establish personal identity," "to gain respect and support," and "to enhance sense of belonging by creating or joining group" ( $M = 4.32$ ,  $SD = 1.38$ , Cronbach's  $\alpha = .86$ ). SNS use for entertainment needs was measured by asking participants to indicate their level of agreement with three statements: "to kill time," "to escape from study or work pressure," and "to have fun" ( $M = 5.15$ ,  $SD = 1.24$ , Cronbach's  $\alpha = .84$ ).

#### *Criterion Variables: Civic engagement*

Civic engagement was measured through two dimensions: offline and online participation in the China smog crisis. After our pilot study and pretesting of our survey items, we modified the scales measuring civic engagement developed by Cheng et al. (2014) and Gil de Zúñiga et al. (2012) to measure these constructs. We performed exploratory factor analysis on the variables, and two items were dropped from the offline civic engagement measure to maximize scale reliability. Civic engagement on SNSs was measured by asking participants, "In the past year, how frequently have you engaged in each of the following activities through SNS?" (1 = *never*, 7 = *I engaged in this activity every time when I logged onto my SNS account*); the activities included (1) seek information about the smog, (2) retweet information about the smog, (3) record the smog by posting information (e.g., photos, texts), (4) express opinions about the smog, (5) "like" a particular post about the smog, (6) comment on posts about the smog, and (7) contact government institutions for resolving this issue ( $M = 2.67$ ,  $SD = 1.51$ , Cronbach's  $\alpha = .93$ ). Offline civic engagement on a similar 7-point Likert scale (1 = *never*, 7 = *I participated in this activity every day*) was measured by asking participants, "In the past year, how frequently have you engaged in each of the following activities?"; the activities included (1) use a particular product or service because of its positive effect on solving the smog issue, (2) avoid a particular product or service because of it can worsen the smog issue, (3) help organize or coordinate charity events about the smog, and (4) participate in voluntary activities related to the smog ( $M = 2.18$ ,  $SD = 1.44$ , Cronbach's  $\alpha = .85$ ).

## Results

Past research has shown that gender, age, education level, and income are sometimes correlated with civic engagement (Gil de Zúñiga & Valenzuela, 2011; Shah, 1998; Verba, Burns, & Schlozman, 1997; Burns, Schlozman, & Verba, 1997). In addition, it has been speculated that the average concentrations of PM<sub>2.5</sub> of a specific location are likely to have a connection with the degree of involvement in the China smog crisis (Greenpeace, 2016). To determine whether any of these variables needed to be controlled in the analyses, we calculated the correlations among these demographic variables and the two forms of civic engagement. As shown in Table 1, smogginess of location was positively and significantly correlated with offline civic engagement as well as civic engagement on SNSs.

**Table 1. Correlations Between Civic Engagement, Demographics, and Smogginess of Location.**

Variable	1	2	3	4	5	6	7
1. Offline civic engagement	–						
2. Civic engagement on social network sites	.65***	–					
3. Smogginess of location	.12**	.15***	–				
4. Age	–.08	.05	.06	–			
5. Gender	–.02	.06	.05	.08*	–		
6. Education level	–.02	–.05	<.01	<–.01	<.01	–	
7. Monthly family income	–.07	–.06	.13**	.33***	.09*	.37***	–

\* $p < .05$ . \*\* $p < .01$ . \*\*\* $p < .001$ .

No other demographic variables were significantly associated with either form of civic engagement. To examine the hypotheses and the research questions, we ran a series of multiple regressions. In these models, smogginess of location was entered in Step 1 only if it was a significant predictor in preliminary analyses. Support for hypotheses and answers to research questions were determined by whether independent variables emerged as significant predictors in the primary regression analyses. Finally, interactions between smogginess of locations and other significant predictors were probed.

### **SNS Use Intensity and Attention to Civic Issues**

For Hypothesis 1, the overall regression model predicting civic engagement on SNSs from measures of SNS use intensity and attention to the China smog crisis-related content was significant,  $F(3, 594) = 127.89$ ,  $p < .001$ ,  $r = .63$ , adjusted  $R^2 = .39$ . Attention to the China smog crisis-related content was positively associated with civic engagement on SNSs. Thus, Hypothesis 1 was fully supported (see Table 2).

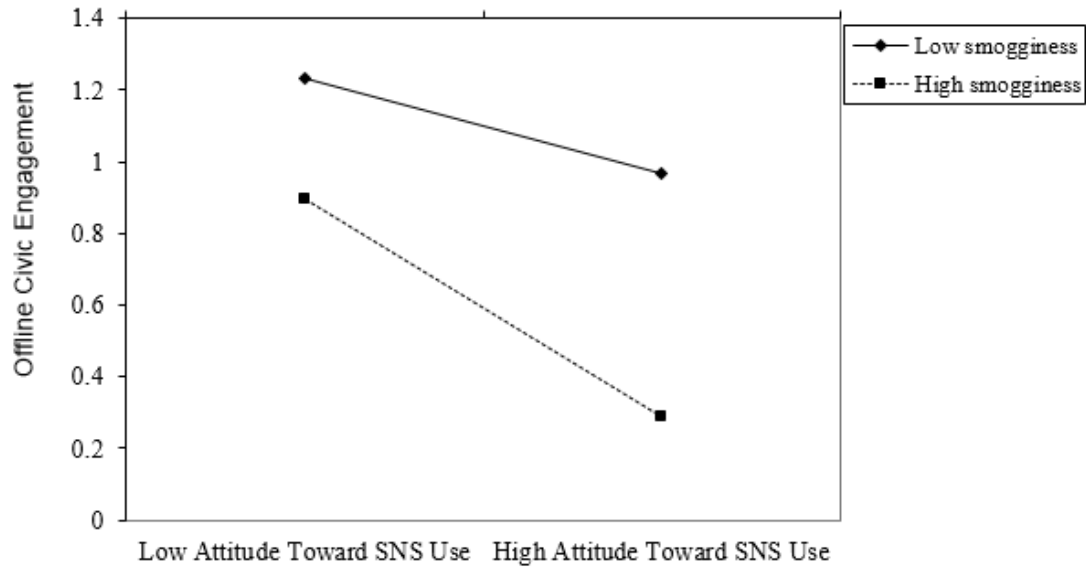
**Table 2. Summary of the Final Regression Model for Predicting Civic Engagement From General Use of Social Network Sites (SNSs) and Attention to Civic Issues.**

Predictor	Component									
	Offline civic engagement					Civic engagement on SNSs				
	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>df</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>df</i>
Amount of SNS use	<.01	<.01	<-.01	-0.18	591	<.01	<.01	.04	1.16	594
Attitude toward SNS use	-.02	.05	.02	-0.47	591	-.01	.04	<-.01	-0.27	594
Attention to the China smog crisis-related content on the mobile Internet	.39	.03	.46	12.37***	591	.57	.03	.62	19.39***	594
Attitude Toward SNS Use $\times$ Location	-.08	.04	-.08	-2.18*	590					593

\* $p < .05$  (one-tailed). \*\* $p < .01$  (one-tailed). \*\*\* $p < .001$  (one-tailed).

With regard to Hypothesis 2, the overall regression model predicting offline civic engagement from measures of SNS use intensity and attention to the China smog crisis-related content was significant,  $F(5, 591) = 31.77$ ,  $p < .001$ ,  $r = .46$ , adjusted  $R^2 = .21$ . Attention to the China smog crisis-related content emerged as significantly and positively associated with offline civic engagement. Thus, Hypothesis 2 was fully supported (see Table 2).

In addition, there was a significant interaction effect between attitude toward SNS use and location (see Figure 1). In both low- and high-smog areas, a higher score or more positive attitude toward SNS use was associated with less offline civic engagement, but the relationship was even more pronounced in the high-smog areas. The group with the most positive attitude toward SNSs and living in smoggiest area had the lowest offline civic engagement scores.



**Figure 1. The interaction effect between attitude toward social network site (SNS) use and location.**

#### **Motives for SNS Use**

For Hypothesis 3 and Research Question 1, the overall regression model predicting civic engagement on SNSs from the four motives of SNS use was significant,  $F(5, 658) = 14.77, p < .001, r = .32$ , adjusted  $R^2 = .09$ . Location was entered as a control variable in this model, and was positively associated with civic engagement on SNSs. Hypothesis 3 predicted that cognition needs would be positively associated with civic engagement on SNSs; however, as shown in Table 3, this association was nonsignificant. Thus, Hypothesis 3 was not supported. In response to Research Question 1, entertainment needs were negatively associated with civic engagement on SNSs, whereas recognition needs were positively associated with civic engagement on SNSs. The association between affection needs and civic engagement on SNS was nonsignificant (see Table 3).

**Table 3. Summary of the Final Regression Model for Predicting Civic Engagement From Motives for Social Network Site (SNS) Use Predictors.**

Predictor	Component									
	Offline civic engagement					Civic engagement on SNS				
	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>df</i>	<i>B</i>	<i>SE</i>	$\beta$	<i>t</i>	<i>df</i>
Smogginess of location	.12	.04	.12	3.12**	659	.16	.04	.15	4.07***	658
Cognition needs	.04	.07	.03	0.58	659	.09	.07	.07	1.34	658
Entertainment Recognition needs	-.15	.05	-.12	-2.68**	659	-.23	.06	-.19	-4.07***	658
Affection	.31	.05	.29	5.68***	659	.34	.06	.31	6.05***	658
	-.03	.08	-.02	-0.39	659	<-.01	.07	.07	1.34	658

\* $p < .05$  (one-tailed). \*\* $p < .01$  (one-tailed). \*\*\* $p < .001$  (one-tailed). \*\* $p < .01$  (two-tailed). \*\*\* $p < .001$  (two-tailed).

It is important to note, however, that the bivariate correlation between entertainment needs and civic engagement on SNSs was nonsignificant; this association became significant once the other variables of the motives of SNS use were entered into the regression model. This suggests that suppression was occurring and that entertainment needs were only negatively associated with civic engagement on SNSs when the influence of other variables was controlled. As found for offline civic engagement, civic engagement on SNSs was best predicted by the combination of having a high need for recognition along with a low need for entertainment.

For Hypothesis 4 and Research Question 2, the overall regression model predicting offline civic engagement from the four motives of SNS use was significant,  $F(5, 659) = 10.82, p < .001, r = .28$ , adjusted  $R^2 = .07$ . Location of participants was entered as a control variable in this model, and was positively associated with offline civic engagement. Hypothesis 4 predicted that cognition needs would be positively associated with offline civic engagement; however, as shown in Table 3, this association was nonsignificant. Thus, Hypothesis 4 was not supported. In response to Research Question 2, entertainment needs were negatively associated with offline civic engagement, whereas recognition needs were positively associated with offline civic engagement. The association between affection needs and offline civic engagement was nonsignificant (see Table 3). Interestingly, when looking at bivariate correlations, it is apparent that suppression was operating on entertainment needs because the zero-order  $r$  was close to 0, but this variable became significantly associated with offline civic engagement when entered alongside the other variables of the motives of SNS use. Thus, the combination of having high needs for recognition along with low needs for entertainment best predicted offline civic engagement.

### Discussion

In many cities worldwide, air pollution has emerged as a key environmental health risk as many people live in increasingly smog-filled “airpocalypse” conditions with significant consequences for their health and well-being. To better understand the China smog crisis and citizen participation, this study investigated connections to a range of social media use, gratification-sought factors, and different modes of online and offline civic engagement. Survey results show that Chinese nationals who often read or watch the China smog crisis-related content such as the air quality index and smog alerts through mobile Internet platforms tend to frequently engage in smog-related activities through SNSs such as WeChat or Weibo, including recording smog developments by posting photos or texts, retweeting information about the smog, and the like. Results here parallel other studies on civic engagement that highlight the positive relationship between SNS use for news purposes and participation in civic and political life (Gil de Zúñiga et al., 2012; Kim et al., 2013). In addition, the results show that Chinese nationals who exhibit a high level of attention to the China smog crisis-related content on mobile Internet platforms are more likely to engage in smog prevention and reduction frequently through a series of activities on the ground, for instance, using air purifiers and avoiding driving private cars for work. Given that past research has shown the role of media exposure in contributing to civic participation (Vitak et al., 2011; Xenos & Moy, 2007), results here add to the understanding of the relationship between civic participation related to air pollution and consumption of air pollution-related content on mobile Internet platforms such as smartphones and smartwatches.

Findings of the study also indicate the importance of geographic locale for communication; in this case, differentiating the location of communication practices within China because significant connections were found between the level of smogginess across 31 cities, municipalities, or autonomous regions of China and on-ground participation in the China smog crisis. We found that attitude toward SNS use had a stronger negative relationship with offline participation in the China smog crisis among Chinese nationals from locations with high average concentrations of PM<sub>2.5</sub> than those from locations with low average concentrations of PM<sub>2.5</sub> (see Figure 1). This finding implies that a high level of emotional connectedness to SNSs and integration of SNSs into daily activities (Ellison et al., 2007) undergirds diminished participation in offline activities related to the smog especially for Chinese nationals from Beijing or Hebei Province, which are more seriously affected by the smog than Tibet or Hainan Provinces, which are relatively less affected by the smog. In other words, Chinese nationals who are more intense in their SNS use in high-pollution regions may tend to be less engaged in smog-related activities on the ground because of time displacement evidenced by the negative effect of media use on civic engagement (Putnam, 2000). Apathy is commonplace among Chinese nationals in high-smog-filled locations such as Beijing (Hallman, 2015) as many citizens develop a sense of fatalism and become habituated to coping with dense pollution. In contrast, Chinese nationals in relatively less smoggy locations may want to engage and do more to protect their cities and prevent their air quality from deteriorating as they witness the negative ramifications of toxic air pollution.

With regard to the motives for SNS use, regression results indicate that Chinese respondents who have a high need of recognition are more likely to participate in smog-related activities, both on SNSs and offline. The positive relationship between civic engagement and SNS use for recognition need demonstrates that Chinese nationals who often use SNSs for establishing personal identity, gaining respect and support, and creating or joining groups may have more opportunities to diversify their social networks and access

information and resources for understanding the smog and cooperate with community members to tackle the issue (Gil de Zúñiga & Valenzuela, 2011, p. 398). Nevertheless, results on the motives for SNS use suggest that affection needs are not associated with participation in the China smog crisis. Because affection needs mainly involve expressing care, sharing personal values, and other similar communication activities between close friends or family members, its connections with participation in public affairs are rather weak (Cheng et al., 2014). In light of this, future research could examine in more detail how the level of online communication among Chinese families and friends is related to the frequency of civic participation in environmental issues.

Another significant finding of this study shows that SNS use for entertainment is associated with decreased participation in the China smog crisis, which is in line with some earlier research showing that media use for social recreation is negatively associated with involvement in public affairs (Shah, McLeod, & Yoon, 2001; W. Zhang & Chia, 2006). This study advances the understanding of civic engagement on SNSs and offline by showing that Chinese nationals who primarily use SNSs for killing time, escaping from study or work pressures, or having fun may be distracted by online entertainment, and therefore spend less time and energy on smog prevention and reduction activities, such as searching for news about air pollution on SNSs and engaging in events that raise the public awareness of the crisis. In this way, our findings contradict some more recent investigations that suggest that television, the Internet, and SNS use for entertainment purposes do not have a significant connection with civic engagement (Campbell & Kwak, 2010; Chan et al., 2012; Quintelier & Hooghe, 2011). Differing connections between civic engagement and media use for entertainment might be correlated with media characteristics, research contexts, or other factors, including differing ways in which the social media interface in China operates to facilitate recreational conditions of use (or the lack thereof) that are related to civic engagement such as programs or games that raise awareness of environmental pollution.

Finally, several limitations of this study need to be acknowledged. As the study used a nonrandom sample, the majority of the participants could have been citizens from urban areas of China. The generalizability of the findings to other populations, such as citizens from rural areas of China, could be potentially problematic given that rural Internet users of China spend less time online per week and are less likely to participate in instant messaging, news, microblogging, and so on than their urban counterparts (eMarketer, 2016).

Second, this study used a self-report questionnaire to explore social media use, political attitudes, and behavioral practices linked to civic engagement and Internet censorship. Although the questionnaire was reviewed and approved by an independent ethics committee, the questionnaire included some relatively sensitive questions that may have posed "the threat of disclosure" to participants and raised their "concerns about possible consequences of a truthful answer should the information become known to a third party" (Tourangeau & Yan, 2007, p. 860). Factors such as social desirability, honesty, and introspective ability, and interpretations of survey questions and rating scales may have increased measurement error and influenced the results of the present study (Hoskin, 2012). Future research could use observational methods and content analyses to provide additional insights to Chinese communication practices grounded in the smog crisis.

Third, this was a cross-sectional study and “because data on each participant are recorded only once it would be difficult to infer the temporal association between” (Sedgwick, 2014, p. 2), the predictors and the criterion variables. Thus, findings here do not confirm causal relations that attention to the China smog crisis-related content on mobile Internet preceded participation in charitable activities related to air pollution or other causal relationships between the measures (Sedgwick, 2014). Future studies could extend this research trajectory by employing longitudinal data collection and analyses to model civic engagement processes as the smog crisis unfurls in different time zones and regions. Future research studies could also broaden this research study by examining other contextual and moderating factors over time, including the possible development of fatalism over the chronic effects of air pollution, which may moderate the effect of SNS use on offline civic engagement.

### Conclusion

Taken together, results on the relationships between participation in the China smog crisis and the use of Internet-based communication resources here lend some support to the empowering view that the Internet provides a relatively open space for Chinese nationals to engage in air pollution issues such as the China smog crisis through various SNS-based activities, although the Chinese government has been strategically managing Internet use among lay Chinese nationals through comprehensive policies and laws (Yuan, 2010). These findings also illustrate how mobile Internet platforms (e.g., smartphones and tablet computers) are critical for communicating knowledge on air pollution issues and mobilizing participation in offline activities among Chinese nationals from different regions (Cheng et al., 2014; Kwak, Campbell, Choi, & Bae, 2011). Results here suggest that channeling the use of Internet-based communication resources into social interaction, such as toward interacting with members within communities, seeking a sense of belonging, and obtaining interpersonal support, may increase public involvement in ameliorating the smog crisis in China, and possibly the global health emergency linked to hazardous air pollution in other contemporary cities.

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