



SCIENTISTS' CONSUMPTION AND PRODUCTION OF SCIENCE INFORMATION
IN NEW MEDIA ENVIRONMENTS

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Scholars have been interested in the public's science media use habits for decades. Information encountered in media shapes public opinions and attitudes toward scientific issues pertinent to society, and its risks and benefits (e.g., Anderson, Brossard, Scheufele, and Xenos, 2012; Brossard, 2013; Brossard, Scheufele, Kim, and Lewenstein, 2009; Cacciatore, Scheufele, and Corley, 2011; Scheufele, 2013; Yeo et al., 2014). Yet, with some exceptions (e.g., Liang et al., forthcoming) few have ventured to ask where and how scientists acquire their scientific information, and how they use new media to communicate about their science.

Communication technologies have changed in the last several decades and the “people formerly known as the audience” (Rosen, 2006) are now content creators. Journalists are no longer the sole conduits through which science information travels from experts to lay audiences. In today's media environment, experts themselves are communicating directly with the public (Brossard, 2013). Science as an institution is so large that every scientist has his or her own niche within any given discipline. Hence, for most scientific issues outside their field, scientists are similar to lay audiences in terms of factual knowledge. Although they may have a better understanding of the “scientific method,” their factual knowledge about science outside their own discipline can be as limited as most laypersons and their attitudes about specific scientific issues informed by similar mental processes.

Cognitive processes and frameworks aside, there is still the question of where scientists obtain scientific news and how they communicate their science with others. Obviously, within one's own research field, primary research literature is a key source of information. But do scientists use lay media to obtain information within their area of expertise? And where do scientists turn for science news unrelated to their own research? Given that it is impossible for scientists to consistently rummage through the primary literature in all fields of science, it is most likely that they get such news from the same sources as the public, namely, media. And finally, to what extent are scientists using new media environment to communicate with others for science related issues?

To answer these questions, we surveyed tenure-track scientists at a large R1 research university in the United States, the University of Wisconsin-Madison. Scientists were asked about their use of media for scientific information both related and outside their fields. Demographic information, including gender, age, years since receiving doctorate, political affiliation, and scientific division were also collected. Our results suggest that R1 scientists do rely on science media in general and social media specifically not only to find out about science, but also to communicate about it.

Method

Sample and Procedures.

In order to obtain a sample representative of tenure-track scholars at a large research institution, we began with a complete list of fulltime tenure-track and tenured faculty engaged in scientific research at the University of Wisconsin-Madison. This was done by accessing websites of relevant departments, colleges, and schools. The university we studied has four tenure-track divisions: biological sciences, humanities, physical sciences, and social studies/social sciences. All tenure-track and tenured faculty members in these divisions were included and categorized based on particular research interests in addition to department affiliations. We identified 1,306 scientists for participation in the survey. After accounting for researchers on sabbatical, those who did not consent to data analysis, and humanities researchers, the survey instrument was sent

to 1,239 scientists. The survey was programmed and administered online using Qualtrics survey software with the help of a survey-programmer.

The survey was fielded in March 2013 with three email waves. Timing and templates for email solicitation are described in Dillman, Smyth, and Christian (2009). The first email was personalized, following Dillman et al.'s recommendations. The second email served as a thank-you and reminder, thus it was sent to all participants. The final follow-up email was sent only to those who had not yet responded. The response rate was 20.5 percent, resulting in a final sample size of 254.

The breakdown of scientists into their broad research disciplines is fairly consistent between the sample and population. Statistics for the population of research scientists comes from the National Science Foundation's "Employed doctoral scientists and engineers in 4-year educational institutions: 2008" report (Milan, 2012). Scientists in the biological sciences, which represent 31.2 percent of full-time, tenure-track and tenured scientists across all U.S. institutions and 36.7 percent of UW-Madison scientists, comprise 36.6 percent of the sample. Respondents in the physical sciences, which make up 35.5 percent of scientists across the U.S. and 36.1 percent at UW-Madison, account for 30.3 percent of the sample. Respondents in social studies/social sciences make up 33.0 percent of scientists across the U.S., 27.2 percent of UW-Madison scientists and 31.5 percent of the sample.

Of those who responded, 66.5 percent are male and 26.8 percent are female, which closely reflects the national breakdown of scientists, 68.9 percent male and 31.1 percent female¹ (Milan, 2012). The mean number of years since receiving their doctorate in our sample was 21.1 years ($SD = 10.8$ years). On a 7-point Likert scale ranging from "very liberal" to "very conservative," the mean ideology of our sample was 2.42 ($SD = 1.23$).

Data analysis

Data analyzed in this report were from two sets of questions designed to tap media use among scientists. The first asked about the frequency of use of "information sources for science news related to [their] field." The second asked about frequency of use of "information sources for science news outside [their] field." Ten separate sources were included in each battery. These were newspapers, news magazines, popular science magazines, the business press, public radio, television, blogs maintained by scientists, blogs unrelated to media organizations, science-only social networking sites, and other social networking sites.

We also asked scientists about their "overall frequency of using social media" for various reasons, including commenting on scientific content, and engaging with lay audiences. Only scientists who use social media ($N = 151$) were asked these items. The exact wording of the questions can be found in the Appendix. To explore scientists' frequencies and reasons for use of social media, we combined the responses to "Rarely," "Monthly," and "Once a week" into one category ("Occasionally"). We also combined "3 times/week," "Daily," and "Many times/day" into one category ("3x/week or more").

¹A breakdown of tenure-track and tenured faculty by gender for UW-Madison scientists is not available. The gender breakdown for UW-Madison is only available on the level across all tenure-track divisions at the university, which in addition to the divisions of interest—biological sciences, physical sciences, and social studies/social sciences—includes the humanities division.

Results and Conclusions

Overall, we found that while scientists continue to use more traditional forms of media, such as newspapers and public radio, they are also beginning to use new communication technologies to both seek and communicate scientific information. Approximately 50 percent of scientists surveyed reported using newspapers for science news. Although science sections in print newspapers have long been shrinking, online versions of the medium allow for a wider range of stories about science. It is likely, therefore, that scientists are finding news about science in online versions of print newspapers.

Interestingly, close to a third of scientists surveyed claimed to occasionally use blogs maintained by scientists for science news (Figure 1). For information related to their field, in particular, roughly 10 percent reported frequent blog usage. This is evidence that scientists are increasingly turning to online sources for scientific information, a trend that has been observed among the general public (Brossard, 2013). However, blogs are not the only platforms that scientists use to seek information. Close to 20 percent of those surveyed reported using social networking sites, including science-only sites such as ResearchGate as well as Facebook and Twitter, occasionally for science news related to their field. Moreover, relative to seeking news from outside their field, a greater percentage of scientists (18 percent) claimed to occasionally use science-specific social networking sites when they sought information related to their field. This finding makes intuitive sense since sites like ResearchGate specifically aim to connect scientists within fields to facilitate sharing of related research and global collaboration.

For information outside their scientific fields, approximately 12 percent of scientists claimed to use general social networking sites frequently. This mirrors the media use trend among the non-expert population—more Americans are consuming news through social media than ever before (Pew Research Center, 2013).

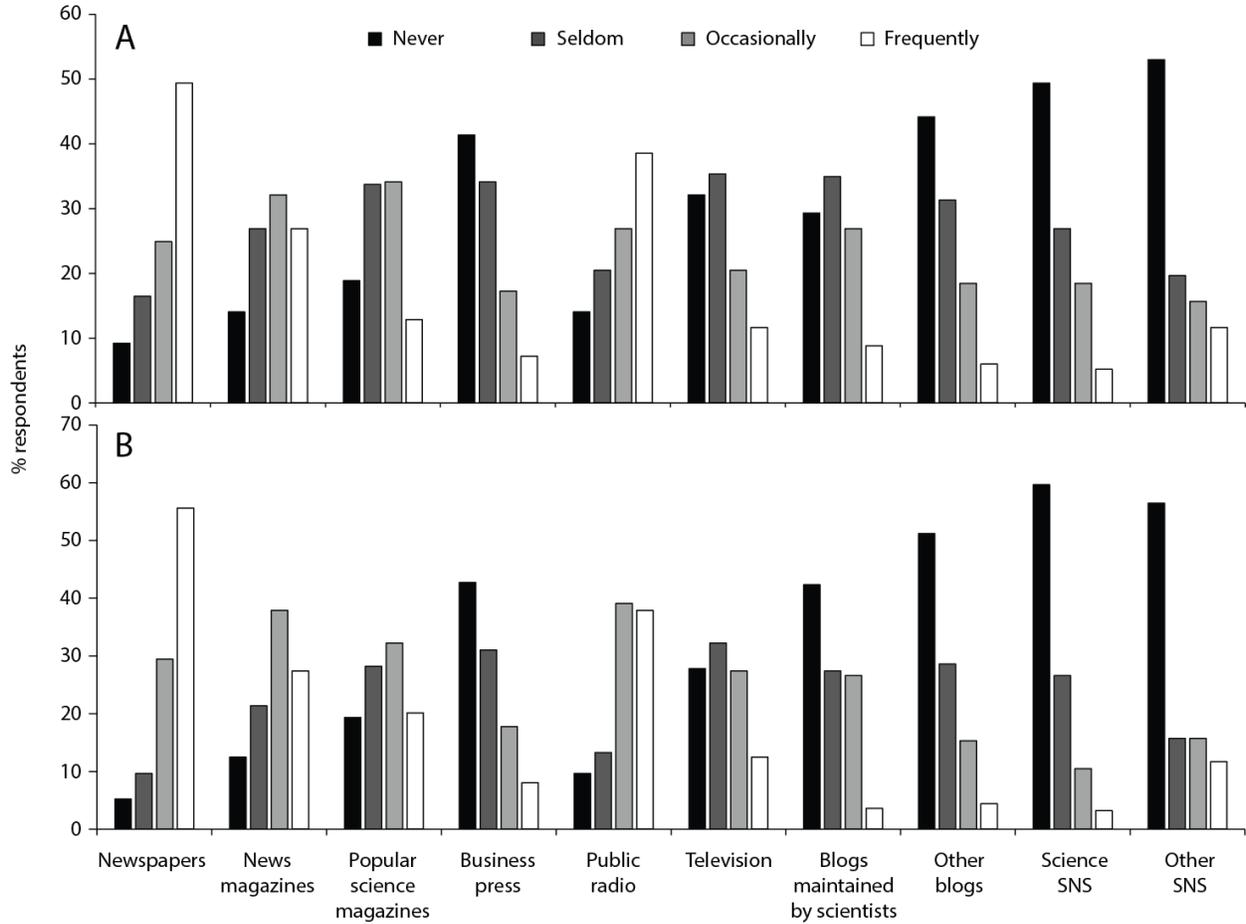


Figure 1. Percentage of scientists ($N = 254$) who reported using various media as sources for science information (A) related to and (B) outside their field of research.

Figure 2 shows the percentage of scientists in each academic division who reported using various media for information related to their research field. Examining media use among scientists by divisions, we found that a slightly higher percentage of physical and social scientists reported using other scientists' blogs occasionally when seeking information. The opposite was observed for information seeking trends on science-only social networking sites. Using general social networking sites was more popular among social scientists than either biological or physical scientists, with close to 20 percent of social scientists frequently using these platforms when looking for news related to their work.

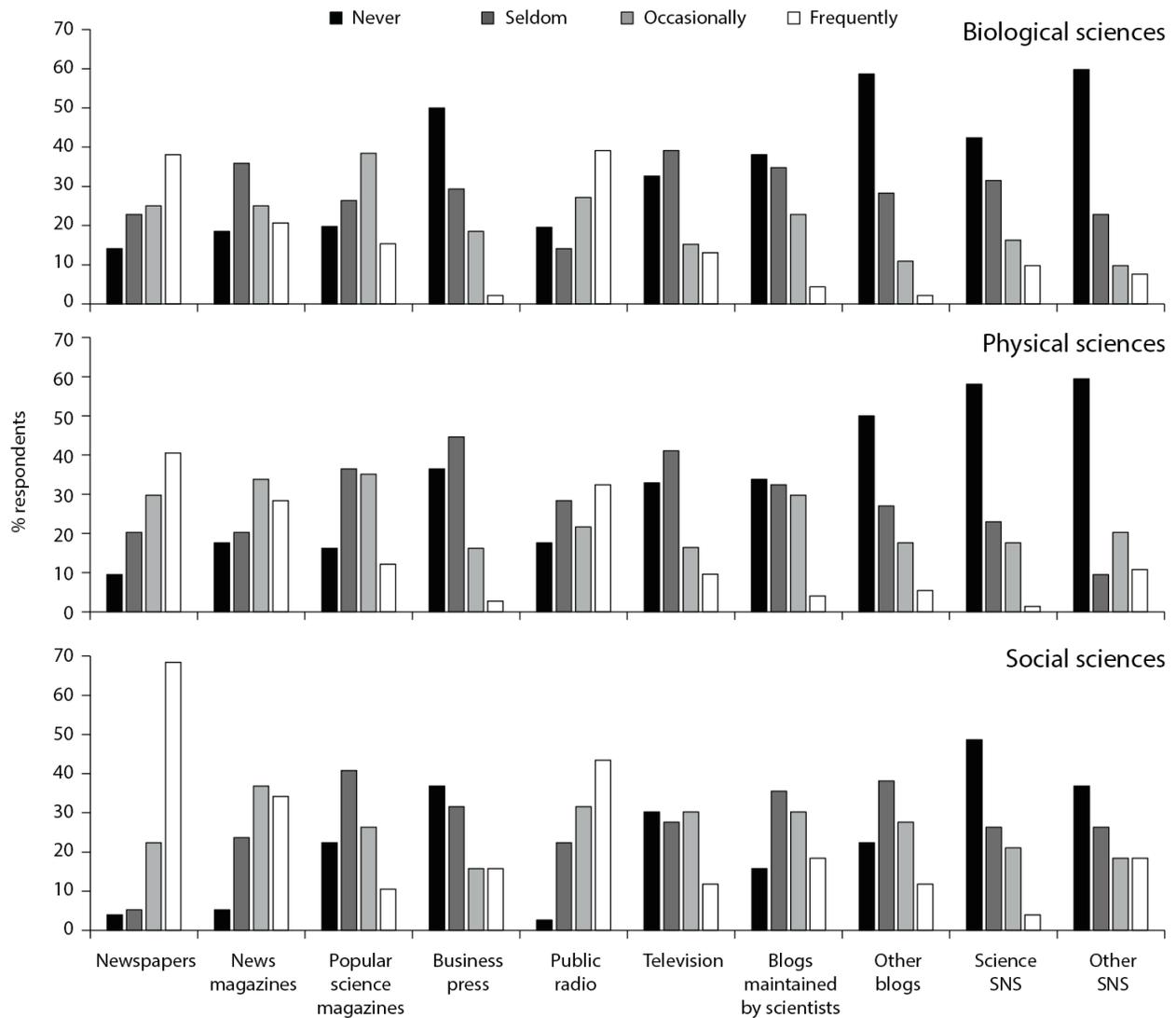


Figure 2. Media sources used by scientists to find information related to their field of research separated into academic divisions. Scientists who identified with more than one division were excluded from this analysis.

Using these data, we also explored some reasons scientists use social media. Interestingly, approximately 65 percent of scientists who use social media report doing so to occasionally engage with public audiences (Figure 3). Forty percent use social media to occasionally blog about their research, which may target expert as well as non-expert audiences. Moreover, 30 percent of scientists used social media at least 3 times a week to look for discussions about science to obtain new insights. In a similar vein with blogging and scanning social media, over half of scientists on social media use it to contribute to online discussions in their field.

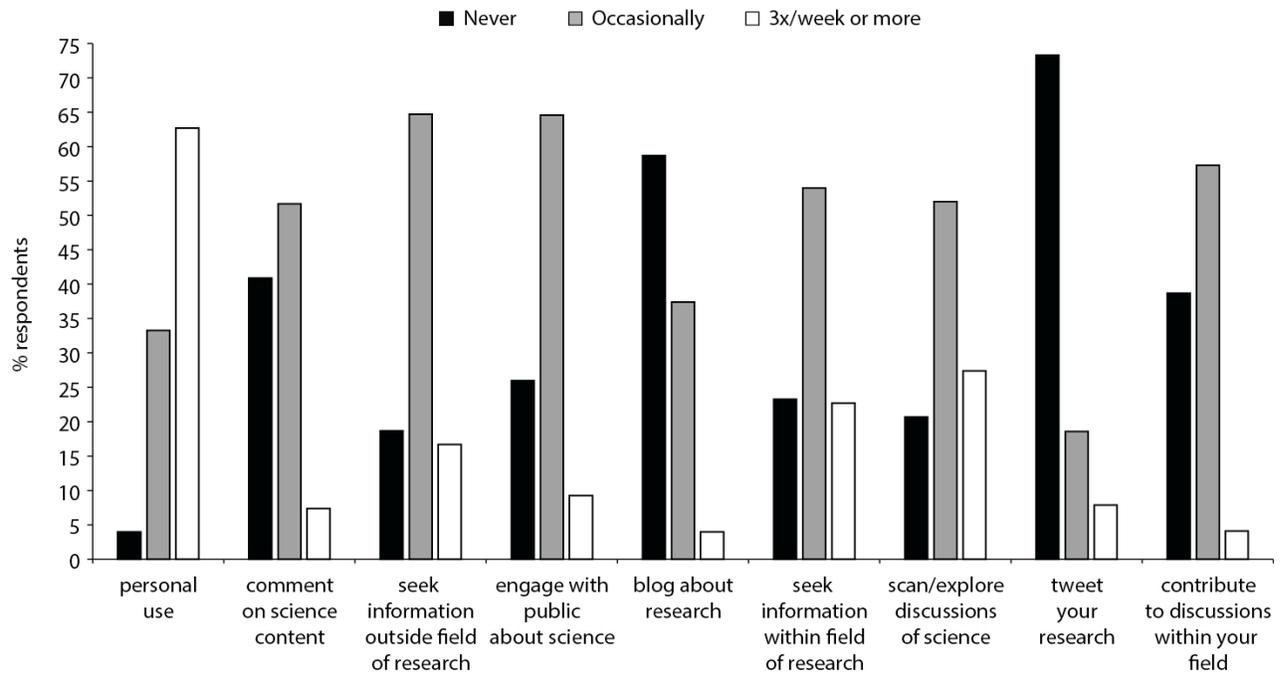


Figure 3. Frequency and reasons for scientists’ use of social media ($N = 151$).

If we further divide these data by academic division, we find that social scientists use social media most frequently (at least 3 times a week) to engage with public audiences (Figure 4). However, a large percentage of biological and physical scientists use social media to engage with lay audiences, at least occasionally. Similar trends can be observed when it comes to frequently blogging, scanning social media for new insights, and contributing to online discussions of science. However, we should not overlook the large percentage of scientists who report occasionally using social media for these purposes.

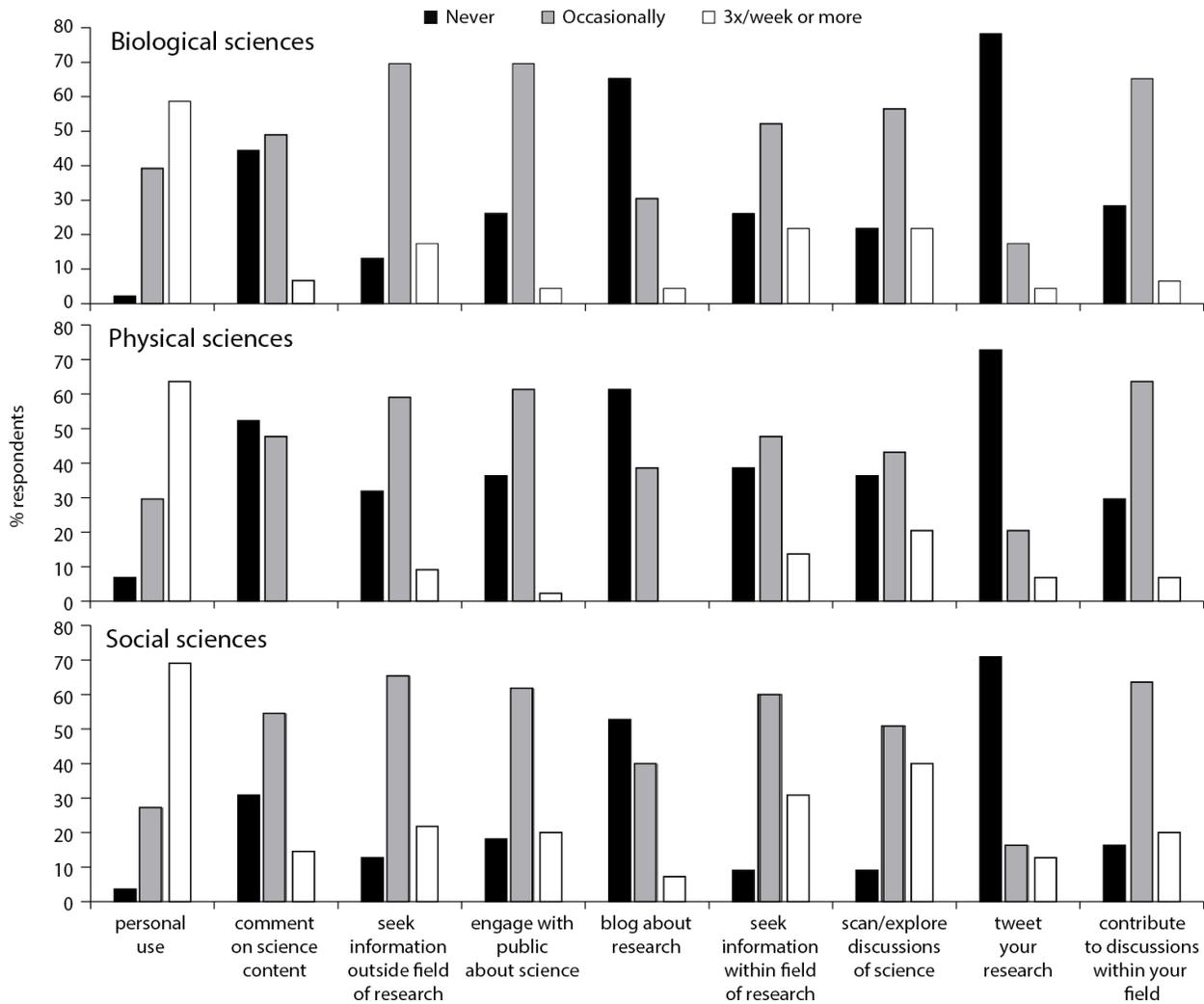


Figure 4. Frequency and reasons for use of social media by scientists who identified with the biological, physical, and social sciences divisions. Those who identified with more than one division were excluded from this analysis.

Overall, our findings point to a significant role for social media in the future of science communication. As general audiences continue to adopt these technologies, especially Twitter, scholars are also likely to use them for outreach purposes. In fact, research has found significant relationships between scholars’ academic impact and public communication, specifically on Twitter (Liang et al., forthcoming). And though many communication scholars have looked at the public’s use of social media, we should pay attention to how and why experts, including academics and policymakers, use social media for public communication.

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Appendix

We are interested in media consumption habits of scientists. How often do you use each of the following information sources for science news **related to your field**? Please indicate the level of use for each of the following media, using a 4 point scale where 1 means you "never use" and 4 means you "frequently" use the media mentioned for science news related to your field.

	1 never use	2 seldom use	3 occasionally use	4 frequently use
Newspapers (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
News magazines (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Popular science magazines (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business press (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public radio (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Television (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blogs maintained by scientists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other blogs not related to a media organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Postings in science-only social networks (e.g., BiomedExperts, ResearchGate)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Postings in general social networks (e.g., Facebook, Twitter, Google+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Now, how often do you use each of the following information sources for science news **outside of your field**? Please indicate the level of use for each of the following media, using a 4 point scale where 1 means you "never use" and 4 means you "frequently" use the media mentioned for science news outside of your field.

	1 never use	2 seldom use	3 occasionally use	4 frequently use
Newspapers (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
News magazines (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Popular science magazines (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The business press (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Public radio (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Television (online & offline)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Blogs maintained by scientists	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Other blogs not related to a media organization	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Postings in science-only social networks (e.g., BiomedExperts, ResearchGate)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Postings in general social networks (e.g., Facebook, Twitter, Google+)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

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Now, we would like to know the nature of your interactions on social media. Please use a 7 point scale where 1 indicates "never" and 7 indicates "many times per day."

What is your overall frequency of using social media to do each of the following?

	1	2	3	4	5	6	7
	never	rarely	monthly	once/ week	3x/ week	daily	many times/ day
• seek specific information about a scientific issue that falls outside your field of research	<input type="radio"/>						
• engage with lay audiences about science-related topics	<input type="radio"/>						
• seek specific information about a scientific issue in your field of research	<input type="radio"/>						
• scan/explore discussion of science and research for new insights	<input type="radio"/>						
• comment on science-related content (e.g. blog posts and videos)	<input type="radio"/>						
• contribute to discussion about your field of research	<input type="radio"/>						
• contribute to discussion about science issues outside your field	<input type="radio"/>						
• tweet about topics related to your research	<input type="radio"/>						
• blog about topics related to your research	<input type="radio"/>						
• use for personal (not research or professional) reasons	<input type="radio"/>						

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