Published in final edited form as:

Disaster Prev Manag. 2012 ; 21(4): 418–432. doi:10.1108/09653561211256134.

Characteristics and influences of H1N1 communication on college students

Alexis Koskan,

Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

Caroline Foster,

School of Journalism and Mass Communications, University of South Carolina, Columbia, South Carolina, USA

Jack Karlis,

School of Journalism and Mass Communications, University of South Carolina, Columbia, South Carolina, USA

India Rose, and

Arnold School of Public Health, University of South Carolina, Columbia, South Carolina, USA

Andrea Tanner

School of Journalism and Mass Communications, University of South Carolina, Columbia, South Carolina, USA

Abstract

Purpose—The purpose of this paper is to assess how college students received and responded to H1N1 pandemic emergency preparedness information and to assess college students' knowledge and attitudes towards H1N1 during the height of the H1N1 epidemic and corresponding public health response to the outbreak.

Design/methodology/approach—Using a case study approach, the researchers conducted five focus groups at a large Southeastern US university between October 20–29, 2009.

Findings—In order to effectively communicate emergency preparedness information to college students, universities should rely on interpersonal communication and mediated communication from trusted sources. College students need to understand the health-related emergency, the risk of the emergency, basic steps to avoid it, and only pertinent cues to action. Oversaturation of this information can lead college students to lessen their perceived importance of the disaster prevention information.

Research limitations/implications—Focus groups were conducted during only two consecutive weeks of the H1N1 epidemic, and snowball sampling may have led to sample bias.

Originality/value—This research was conducted during the height of the H1N1 pandemic, and is the only study to date that explores college students' knowledge, attitudes, and behaviors towards H1N1.

Keywords

Emergency preparedness; H1N1; Pandemic; Natural disaster; Emergency measures; Health communication; Students; Communication; United States of America

The influenza pandemic of 2009 posed unprecedented challenges to public health systems worldwide. The first case of the H1N1 virus was discovered in March 2009 in La Gloria, Veracruz, Mexico, and on April 17, the first US case was reported (Centers for Disease Control and Prevention (CDC), 2010b). On June 11, the World Health Organization declared H1N1 a global pandemic. At that time more than 70 countries reported cases of H1N1, and the CDC projected that 40 percent of the US population would be exposed to the virus (CDC, 2010b).

The scientific community feared the H1N1 virus would mutate into a deadlier, medicine-resistant flu strand that would have similar lethal affects as the influenza outbreak of 1918, which infected roughly one-third of the world's population and was responsible for more than 50 million deaths (Fidler and Gostin, 2006). Furthermore, the US Department of Health & Human Services (USDHHS) predicted that H1N1 would "disproportionately affect young people," specifically college students (USDHHS, 2009, p. 3). On August 20, 2009, the CDC issued an H1N1 alert to US colleges and universities (CDC, 2010a), and by September 3, 55 percent of the schools surveyed by the American College Health Association reported cases of the virus (CBS News, 2009). During the last week of October 2009, 266 college institutions reported a total of 9,128 cases of H1N1 (American College Health Associations, 2009).

The H1N1 pandemic in fall 2009 provided a unique opportunity to explore how college students received and responded to emergency preparedness information during the height of the outbreak. Students were exposed to H1N1 public health emergency messages through campus public health officials, and many US institutions of higher education created prevention and response plans for their students, faculty, and staff (CDC, 2009). National, state, and local public health organizations also produced media campaigns that informed the public how to identify symptoms of H1N1 and provided flu pandemic-prevention information (Neumann *et al.*, 2009). At the same time, local and national news organizations reported information regarding the spread of the disease and public health disaster preparedness and management information. Although Gray *et al.* (2011) explored the general public's attitudes and behaviors regarding flu pandemic prevention and control messages, no studies to date have documented how communication about the H1N1 pandemic, through media and interpersonal communication channels, influenced college students' knowledge, attitudes, and behaviors about H1N1.

Using a case study approach, the researchers conducted a series of focus groups at a large US university to assess how students received and responded to the H1N1 emergency preparedness information prevalent in various communication channels during this time. Specifically, the primary objectives of this study were: to assess college students' knowledge and attitudes toward H1N1 during the 2009 pandemic and to evaluate how media

and interpersonal H1N1 messages influenced students' knowledge and behavior during the height of the H1N1 pandemic and corresponding public health response to the outbreak.

Communicating public health emergency information: theoretical background

Research examining how the general public accesses crisis management and emergency preparedness information during a public health emergency suggests that the public either passively receives information in their environment (including the media environment), or they actively seek information through media (e.g. television, newspapers, the internet) and interpersonal sources in their social environments (Seeger *et al.*, 2008). In a study that explored the media sources people used to seek flu prevention and treatment information, a majority of respondents (69 percent) reported receiving their emergency preparedness information from television news, and roughly half (49 percent) said they searched internet web sites (Pew Internet and American Life Project, 2009).

People also seek health and emergency preparedness information from members of their social networks, and often this is the first place they go when seeking this type of information (Curry, 2007). Regardless of how the public receives public health emergency information, public health officials and health-related professionals are ultimately responsible for providing continuous communication to inform the public of possible risks and responses of emergencies (Hyer and Covello, 2005; Institute of Medicine (IOM), 2008).

Studies suggest that the college student population seeks health information in a different manner than the general public. Whereas the general public more often seeks information through television (Loges, 1994; Lowrey, 2004), college students are more likely to turn to the internet for health information (Escoffery *et al.*, 2005). For example, Pryor *et al.* (2005) found that colleges have successfully used internet-based communication to reach students during a health emergency. In attempt to help sort the masses of available information available on the internet, Curry (2007) suggests that students often they turn to their families for guidance and to interpret this information.

Little is known about how this age group seeks and processes information about H1N1 or other communicable diseases. College campuses, which often serve as the home and work environment of college students, are particularly vulnerable to communicable diseases (USDHHS, 2009), and students living in dormitories are at higher risk of disease than those living off-campus (Harrison *et al.*, 1997). Therefore, it is important to identify how best to communicate with these students in the event of a public health emergency.

The research is guided by two theories grounded in the field of mass communication, agenda setting (Shaw and McCombs, 2005) and two-step flow (Lazarsfeld *et al.*, 1948), and by a public health theory, social cognitive theory (Bandura, 1977). Mass media serve as agenda setters for important health issues by translating health information they deem important into news stories, thus transferring the information from the media's agenda to the public's agenda (Shaw and McCombs, 2005). Two-step flow of information describes how the news story is then intercepted and mediated by opinion leaders in a community before it reaches

the public (Lazarsfeld *et al.*, 1948). The social cognitive framework illustrates how the physical and social environments (e.g. media and interpersonal communication) interact with behavioral determinants (e.g. knowledge and attitudes) to, in turn, influence health behaviors (Bandura, 1977). Based on these theoretical perspectives and the relevant health communication and disaster preparedness literature, the following research questions were developed for this study:

RQ1. From which mass mediated, interpersonal, and other mediated sources (e.g. text messaging and e-mail) are college students getting general health-related information?

RQ2. From which mass mediated, interpersonal, and other mediated sources (e.g. text messaging and e-mail) are college students getting H1N1 health-related information?

RQ3. What information or knowledge do college students have about H1N1?

RQ4. What are college students' attitudes toward H1N1?

RQ5. How have mass mediated, interpersonal, and other mediated H1N1 messages influenced college students' behaviors?

Research design

The researchers utilized a qualitative research design to broadly explore the meaning and context of a public health phenomenon (Maxwell, 1990). Specifically, the authors chose focus groups in an effort to create a group discussion to explore participants' overall views and perceptions regarding an issue (Kitzinger, 1994). During this type of group discussion, individual participants learn about other participants' viewpoints and experiences, and, in turn, recall, compare, and contrast their own experiences (Merton *et al.*, 1990). The authors specifically selected this research methodology in order to explore how college students processed and responded to H1N1-related media and interpersonal messages.

Qualitative research often uses purposive (or purposeful) sampling to gather data about specific sub-populations (Maxwell, 2005). Therefore, we relied on snowball sampling techniques to identify potential focus group participants (i.e. college students exposed to H1N1 messages) and, in turn, for these individuals to help recruit more potential participants (Fossey *et al.*, 2002). This sampling technique has been employed in previous communication-related studies focussing on college students (Kramer and Hess, 2002; Quick, 2009). We asked four course instructors to obtain names and contact information of students interested in volunteering for the research study. Instructors also asked these students to recruit classmates and friends to participate in the study. Students were asked to consider diversity (e.g. major, classification, gender, ethnicity) when recruiting friends and colleagues to these focus groups. A total of 78 names were submitted as potential focus group participants. Of this number, eight refused participation, and ten never attended one of the focus group sessions. Therefore, a total of 60 college students participated in the focus groups. We conducted five focus groups between October 20 and October 29, 2009.

Focus group procedures

Researchers developed a focus group guide to qualitatively elicit students' perceptions and attitudes toward H1N1 information, including their level of knowledge about H1N1 and the

frequency of discussing the topic; students' H1N1 sources of information; and how the information obtained through these sources influenced their H1N1-related attitudes and behaviors. Focus group guide questions were theoretically influenced by social cognitive, agenda setting, and two-step flow theories, and other questions were adapted from focus group questions used in previous research studies regarding the media's influence on health behaviors (Besley, 2008). The study protocol was approved by the University of South Carolina Institutional Review Board. Examples of questions used to elicit responses from the students during the focus group sessions are included in the following list. At the beginning of each focus group, researchers provided a summary of the project and administered an informed consent document (Appendix 1):

1. From what sources did you hear about H1N1 specifically?
2. Describe the last conversation you had about H1N1. Be specific.
3. What did you draw on for information in that flu conversation?
4. If you wanted more information about swine flu after seeing or hearing a message about it, what would you do?
5. What traditional media like mainstream radio, TV, and newspapers for H1N1 information?
6. What organizations outside of campus do you turn to for information about H1N1?
7. What campus organizations do you turn to for information about H1N1?
8. What do you know about H1N1?
9. What is your general reaction H1N1? Is it a threat to your personal health?
10. What types of preventive measure do you take to avoid contracting H1N1?
11. How have mediated messages affected your response to the H1N1 outbreak?
12. How and from whom do you prefer to receive H1N1 and other emergency preparedness information?

After completing the five focus group sessions, researchers transcribed the interviews verbatim into separate Microsoft Word documents. One of the researchers compiled all of the focus group data into one document, organizing the responses by topic and then by question before sending it to the other researchers for analysis. Researchers used grounded theory's constant comparative techniques to identify "open" codes, exact words or codes pulled from the focus group transcripts, and "selective" codes, which identify themes and sub-themes of the data (Bowen, 2005; Strauss and Corbin, 1998). All members of the research team read the interviews multiple times, created initial codes, recoded the data based on initial and emerging codes, and met as a team to discuss individual codes and themes. Specifically, we discussed our interpretations of the data to gain an overall consensus of our perceptions of the focus group narratives.

Results

Of the 60 study participants, 15 percent were freshmen, 52 percent sophomores, 22 percent juniors, and 11 percent seniors. A total of 15 percent of the sample was male and 85 percent was female. The majority of students identified themselves as white (85.2 percent), Asian (7.4 percent), or they listed a different ethnicity (7.4 percent). The majority of focus group participants (72 percent) lived on campus. Reported majors included advertising, biology, geology, journalism, international business, math, nursing, and public relations.

Qualitative focus group results

Emerging narratives from the focus groups illustrated where and from whom participants either passively received or actively sought general health and H1N1-specific health information. Participants described their knowledge and attitudes regarding the H1N1 virus and the mediated and interpersonal information they were receiving. They also discussed their preferred communication channels for receiving emergency preparedness information in future campus health communication efforts.

Seeking general health information

Participants reported receiving general health information from interpersonal sources and from the mass and campus-wide media. When actively searching for general health information, students reported retrieving more information about health current events and disease-specific information from their parents (particularly their mothers) than from any other interpersonal and media source. One student responded, “I call my mom because she knows what’s going on.” Another reported, “I ask my dad because he tends to surf the Internet more than I do.” Fewer students indicated that they received their general health information from their health care providers, friends, and professors/classroom instructors.

Students reported using media sources more heavily for health information. They most often reported searching the internet, using search engines (particularly Google) for wellness information on such topics as “diet” and “physical activity.” For disease-specific information, students reported searching for information from search engines and also from specific health web sites. One student reported searching for reliable health information from “credible” health-related web sites, such as Web MD.

Passively receiving H1N1 health-related information

When asked about the specific topic of H1N1 health information, all focus group participants reported having seen, read, or heard information regarding H1N1 in campus-based and also mass media sources. Most students first passively received information about the H1N1 virus through media, meaning students came across the information while engaging with media for other purposes. The two most often media sources in which the students originally received H1N1 information were national television news outlets (particularly CNN) and internet web sites. Other media sources students identified were local television news stations, the local newspaper, and internet advertisements. On campus, the most recognized source of H1N1 preparedness information was posters located in

various parts of the university. One student reported “The signs are everywhere. You can’t miss them.” Another student said, “They [posters] are in every building on campus. There are fliers in the bathroom, in our dorms, at the gym, at the bookstore, in our classrooms. You can’t get away from the information.”

Students also passively received information from online media sources such as web advertisements and news stories located on search engine home pages. When asked specifically about where students recalled seeing H1N1 information online, students provided the following responses: “on Yahoo – it’s my homepage,” “on the Internet [in general],” and on internet advertisements. Students reported seeing H1N1 information less often in the campus newspaper and campus-distributed e-mails.

Actively seeking H1N1-related information

Students reported actively searching for information about H1N1 when the media first began producing news content about the dangers of H1N1. When students viewed H1N1 as a health threat, they were more likely to search Google or other search engines. However, students said that once their social and media environments became saturated with H1N1 information they no longer actively searched for more information.

Participants both actively sought and passively received interpersonal sources of H1N1 information from their professors, family members, friends, physicians, and also individuals who had contracted H1N1. Students more often asked their parents and physicians about H1N1, whereas they received information from professors, friends, and acquaintances. For H1N1 information, students perceived their professors and parents as more credible sources than their friends and colleagues. They believed their parents were more credible since they often watched the news and shared some of this information with their children. One student reported, “My mom told me what she heard about H1N1. She watches CNN.” Others believed their parents were credible sources because they were health professionals. “My mom is a nurse, so she knows more information about the flu and H1N1.” A few students mentioned speaking with experts (e.g. health care providers) about H1N1. “I go to my parents for everything first. If I need to investigate further, I talk to my doctor.” Some students reported hearing H1N1 information from television news and then clarifying what they learned via the media with family members and friends. Another student noted that before receiving H1N1 information from family and friends, “I would first need to hear about where they heard their information.”

Many students reported talking to a friend or family member who had contracted H1N1 or experienced H1N1 symptoms, and often these reports signified that H1N1 was not a deadly virus or severe health threat. “I talked to my friend who had swine flu, and it wasn’t as bad as they said it was.” Many students described how their friends laughed at H1N1 media messages, stating that H1N1 was “an on-going joke.” The students’ overall perceptions of H1N1 were that the virus was a typical, unpleasant illness, although media and other interpersonal messages framed H1N1 as a severe and deadly virus.

H1N1 knowledge

Regarding students' level of H1N1 knowledge, participants reported knowing basic information about H1N1. For example, some students were able to clearly state the differences in symptoms between the H1N1 influenza strain and the common flu. They reported that mass media sources informed them about the populations most susceptible to H1N1, specifically and correctly mentioning older adults, pregnant women, and individuals with pre-existing health conditions. Many students also reported increased awareness of germs and the need to employ H1N1-prevention techniques such as washing their hands, using hand sanitizers and sanitizing wipes, sneezing into their elbows instead of their hands, and avoiding contact with individuals with H1N1.

Despite correctly identifying susceptible populations and general flu-prevention techniques, many students reported being uncertain about their H1N1 knowledge. Some students did not know the differences between the normal seasonal flu strain and H1N1: "I know it's different, but I don't know anything else about how it is different." They were also unclear about how H1N1-prevention tactics differed from measures used to avoid the common flu. Some students expressed doubt about the positive effects of the H1N1 vaccine. "I'm not sure if the shot is safe" was a common response, and one student noted, "For every 100 people that get the vaccine, 25 get the virus."

Other students' H1N1 knowledge was incorrect, particularly when asked to describe their perceptions of the origins of H1N1. One participant stated, "The pigs got sick, then the people got sick, and then it was the flu." Also, few students reported that they had recently learned new information about H1N1. Instead, many said that the information they heard was "all the same."

Attitudes about H1N1

When participants began believing that H1N1 was not a deadly virus, they perceived the extensive H1N1-prevention information to be superfluous and redundant. Students agreed that there was too much prevention-related information and that it was "all the same stuff." Another student commented, "[H1N1 information] may have been helpful the first five times I heard it." "I went to a H1N1 summit at the convention center and there was nothing new. It was for the healthcare providers to distribute the shots, but there was no new information," said another student.

One theme that emerged from the data was that students generally did not view H1N1 as an imminent threat. One commented, "It's always something," describing how there always seems to be a major health concern of which to be wary. For example, one student recalled the avian flu as one of the last health pandemics that received the same kind of exposure as H1N1. Another student believed that "swine flu is overplayed and [the media coverage] is out of control." Other students agreed that the media is simply trying to create fear and panic with their health communication messages about H1N1. "People are getting more nervous than they need to be – They [the media] are trying to scare people," said one respondent. Again, students often reported making jokes about H1N1. "They call it 'pig flu' and that just makes me laugh." One student described a "pig flu Halloween costume" and had joked

about wanting to purchase the costume. A student athlete also responded, “We made a joke about it in the locker room –someone was doing something unsanitary, and we said they were spreading swine flu.”

H1N1-prevention behaviors

When students felt personally threatened by the H1N1 outbreak (e.g. when information first appeared in the media), they were prompted to take action to better understand the extent of the threat of H1N1. Their initial reactions included seeking additional information – online and through trusted information authorities such as parents and personal physicians. “When I first found out about swine flu and how dangerous it was, I looked for information,” one student said. Reported behavioral changes included washing their hands more frequently, using anti-bacterial hand sanitizers, opening doors without using the direct contact of their hands (e.g. using paper towels), sneezing into their elbows rather than their hands, and avoiding crowded places. These behaviors, however, were not specific to avoiding the exposure to the H1N1 virus. “It’s just the same old stuff they’ve been telling us to do since kindergarten.” However, even though students believed that the H1N1 information was excessive and redundant, they reported having practiced general flu preventive behaviors that were stressed in the H1N1 preventive messages. It is possible that participants became more sensitive to the flu-prevention information and increased their preventive behavior, but that was not measured in this study.

Of the few focus group participants who said they did not change their behavior regarding H1N1 prevention, the most common reason for not adopting flu-prevention behaviors was their fatalistic belief that nothing could prevent contracting H1N1. Specifically, students reported being skeptical of how well the general flu and H1N1 vaccinations and also flu-prevention behaviors helped them to prevent contracting the virus. “It didn’t seem like there was much you could do to prevent it.”

Preferred method for receiving emergency information

Participants preferred receiving emergency preparedness information (such as H1N1 information) directly from the school administration via text messages and e-mails. They recommended using these personalized modes of communication to reach them directly so they would not have to actively search for important health information. Participants also reported that in the future, if these channels of communication are overused, they will not pay attention to the messages sent by school administration. Students also preferred that their professors communicate this important information during class periods.

Discussion

Most students reported first hearing about H1N1 through mass media. During the first few weeks of the crisis, mainstream media and their corresponding web sites set the students’ agenda by informing them of the H1N1 threat. This finding is consistent with previous research that suggests that mass media serve as an agenda setter for important health issues, transferring these issues from the media to the public’s agenda and playing a crucial role in

the communication of health messages (Entwistle, 1995; Jones, 2004; McCombs and Shaw, 1972; Nelkin, 1996a, b).

College students obtained and sought H1N1 information on the internet (particularly via Google) after hearing about the virus through traditional media. This concurs with research by Kittler *et al.* (2004) who found that during public health emergencies some members of the population turn to the internet to get more information or use the internet to clarify the information they learned through broadcast or print mass media. Further, student participants' reliance on Google is not surprising, since most online consumers search for information through search engines, and Google is the top search engine, used in 71 percent of all online searches (Hitwise, 2010).

While most students initially became aware of the H1N1 virus from mass media sources, many students also relied on opinion leaders such as parents, professors, friends, and physicians, to help them filter and respond to such information. Consistent with the two-step flow of information (Lazarsfeld *et al.*, 1948), this study found that students considered parents and professors to be credible interpreters and mediators of H1N1 news and information. Source credibility, defined as "the attitude toward a source of communication held at a given time by a receiver" (Self, 1996), is often divided into two dimensions, including the concepts of trustworthiness and expertise (Hovland and Weiss, 1951). Specifically, data from this study revealed that college students had a high level of trust for their parents' knowledge and opinions of the H1N1 information and perceived their parents as "experts" on this health topic. Therefore, college health practitioners could make sure that in future emergency preparedness initiatives, parents also receive important campus-related health messages that they could relay to their children (Self, 1996).

Students wanted emergency preparedness information to be sent directly to them through various communication technologies vs having to actively search for the information. Bürgelt *et al.* (2009) made similar recommendations of using various channels to communicate emergency preparedness messages to reach intended audience. Because findings from this study are consistent with previous research in this area, college administrators should develop communication tools (i.e. e-mails, text messages, and social media) to inform parents and professors of key public health emergency information. In turn, these "opinion leaders" could then deliver the important health messages to the students.

It is interesting to note that student participants made no mention of campus health professionals as a source of H1N1 information. In fact, only campus administration and course instructors were mentioned as primary sources of public health management and prevention information. Perhaps this is because students associate these health professionals as a primary source only when it comes to treating a specific ailment. Nevertheless, results from this study suggest that campus health officials could identify strategies that will promote the comprehensiveness of their services that include treatment and prevention. Because students see instructors and administrators as opinion leaders and credible sources of information, we suggest that campus health professionals also provide seminars to instructors regarding how to respond and how to relay information to students during a

crisis. Universities could create emergency preparedness and response plans and communicate such plans (via web site, flyers, e-mails) to students, parents, and faculty.

Over time, students changed their perceptions of H1N1's severity, and they began to ignore and even mock H1N1-related communication. Participants also discussed how the media's exaggeration of the virus' severity paired with their reality of H1N1 led to a "cry wolf" effect. This is consistent with past research that described how false predictions and alarms desensitized the public to emergency preparedness communication (Brayall *et al.*, 2008; Stoto, 2008).

Despite these negative responses to H1N1 mass media information, many college students reported enacting flu-prevention behaviors. Campus media, particularly posters produced by distributed by campus health services, helped to raise awareness of the H1N1 virus and prompted students to act to prevent the acquisition and spread of H1N1. The information that students received via campus media was basic prevention advice. Because this information was simplistic and provided simple cues to action to prevent the onset of H1N1, most students recalled the information provided on the campus posters during focus group sessions. Past research has demonstrated that simple cues to action are necessary to prepare the public for a public health emergency (Wray *et al.*, 2008).

Students lacked knowledge and remained uncertain about information regarding the H1N1 vaccine and the effectiveness of the flu-prevention behaviors. Of the students who were not vaccinated for this particular flu strand, few reported that they had never heard of the H1N1 vaccination while others were wary of its possible effects. These findings concur with previous research which suggested that lack of knowledge and uncertainty may lead to health behavior inaction (Bouwan *et al.*, 2007). Also, participants reporting having a more fatalistic view of contracting the virus believed that there was no way to avoid the virus and less often reported enacting flu-prevention behaviors. This is consistent with past research that demonstrates how fatalism may lead to learned helplessness (Peterson *et al.*, 1993). Further, this learned helplessness may negatively influence individuals' likeliness to prepare for disasters (Weiner, 1986).

Conclusion

This study, conducted during the height of the 2009 H1N1 pandemic and corresponding public health response to the outbreak, has important implications for college health practitioners who are tasked with providing the college-aged community with crucial health information in the event of a public health crisis as well as educating students on how best to prepare and respond to a health crisis such as a pandemic. As the IOM prioritizes improving emergency preparedness as one of its top research responsibilities (IOM, 2008), this study provides insights regarding how college students respond to continuous communication efforts to inform them about a public health crisis and the associated risks. Although mass media proved to be an effective means of communicating initial H1N1 awareness, interpersonal communication and simple tailored messages distributed through new media (e.g. e-mail, texting) and traditional campus posters must be utilized to communicate with students once they become inundated with messages and are no longer seeking health

information through traditional mass media channels. While students in this study expressed feeling overwhelmed with H1N1 information, they still had unanswered questions about basic information regarding this strand of flu. Results from this study could help college health practitioners prepare for the next health pandemic by improving how they communicate with their target audience.

This study has limitations that should be considered when interpreting the results. The study was conducted during a two-week time span, and it relied on self-report data. However, since this was an exploratory study and because focus groups were conducted during the height of the pandemic, this was the most appropriate and feasible methodological approach. Furthermore, although every attempt was made to recruit participants that accurately reflected the student population, the snowball sampling method used to recruit participants may have led to selection bias. During the focus groups, some participants were more vocal than others. This could have affected the data and overall results. The authors tried to address this issue by encouraging all participants to speak and share their opinions and experiences during the focus groups. Finally, the purpose of this study was to explore students' perceptions, attitudes, behaviors, and knowledge. Therefore, researchers did not measure changes in attitude and behavior due to the H1N1 mediated and interpersonal communication.

This study provides preliminary insight into how college students received and responded to the H1N1 emergency preparedness information prevalent in various communication channels during the influenza pandemic of 2009. Future avenues for research include conducting a mixed methods study with a larger representative sample of college students at various institutions of higher education, perhaps distributing a survey to students in an effort to measure knowledge, attitudinal, and behavioral responses to emergency preparedness information. Additional focus groups should also be conducted to explore students' perceptions about such information. These studies could use pre- and post- questionnaires to measure how students' knowledge, attitudes, and behaviors may have changed due to an emergency preparedness intervention. Researchers could also conduct this as an international study, expanding the sample to a more global audience. Another fruitful area of research could explore the sources of health communication information disseminated in the college setting in an effort to analyze these messages in terms of cues to action and mobilizing information.

Acknowledgments

This study was supported by the Science and Health Communication Research Group at the University of South Carolina.

References

- American College Health Associations. [accessed March 20 2010] ACHA pandemic influenza surveillance: influenza like illness (ILI) in colleges and universities. 2009. available at: www.acha.org/ILI_Project/ILI_Surveillance.cfm
- Bandura, A. Social Learning Theory. General Learning Press; New York, NY: 1977.
- Besley J. Environmental perceptions among green quad residents. 2008 unpublished manuscript.

- Bouwan, LL.; Koelen, MA.; Hiddink, GJ. The personal factor in nutrition education. In: Kok, F.; Bouwman, L.; Desiere, F., editors. *Personalized Nutrition: Principles and Applications*. CRC Press; Boca Raton, FL: 2007. p. 169-81.
- Bowen GA. Preparing a qualitative research-based dissertation: lessons learned. *The Qualitative Report*. 2005; 10(2):208–22.
- Bürgelt, PT.; Paton, D.; Johnson, D. Factors and Processes Influencing Individual and Community Preparedness for a Pandemic Outbreak in New Zealand. GNS Science; Lower Hutt: 2009.
- Brayall, M.; Andrishak, R.; Hicks, F. Ice jam flood forecasting expert system for the Hay River at Hay River. paper presented at the 19th IAHR International Symposium on Ice; July 6–11; Vancouver. 2008. available at: http://staff.civil.ualberta.ca/water/FEHicks/Papers/Brayall_et_al_IAHR_paper%20_105_final.pdf
- CBS News. [accessed March 20, 2010] Some colleges using H1N1 isolation dorms over half of reporting schools have cases; Northwest and Southeast hardest hit. CBS News. 2009 Sep 3. available at: www.cbsnews.com/stories/2009/09/03/earlyshow/health/main5284610.shtml
- Centers for Disease Control and Prevention. [accessed October 4 2009] CDC guidance for responses to influenza for institutions of higher education during the 2009–2010 academic year. 2009. available at: www.cdc.gov/h1n1flu/institutions/guidance/
- Centers for Disease Control and Prevention (CDC). [accessed February 10, 2010] H1N1 flu (swine flu) infections alert for institutions of higher education. 2010a. available at: www.cdc.gov/h1n1flu/college-alert.htm
- Centers for Disease Control and Prevention (CDC). [accessed February 21, 2010] Novel H1N1 flu: background on the situation. 2010b. available at: www.cdc.gov/h1n1flu/background.htm
- Curry, C. Antecedents to information seeking behavior: the role of prior experiences on self-efficacy. paper presented at the National Communication Association (NCA); Chicago, IL. November 15–18; 2007.
- Entwistle V. Reporting research in medical journals and newspapers. *British Medical Journal*. 1995; 259(7):1036–8.
- Escoffery C, Miner KR, Adame DD, Butler S, McCormick L, Mendell E. Internet use for health information among college students. *Journal of American College Health*. 2005; 53(4):183–8. [PubMed: 15663067]
- Fidler DP, Gostin LO. The new international health regulations: a historic development for international law and public health. *The Journal of Law, Medicine & Ethics*. 2006; 34(1):85–94.
- Fossey E, Harvey C, McDermott F, Davidson L. Understanding and evaluating qualitative research. *Australian and New Zealand Journal of Psychiatry*. 2002; 36(6):717–32. [PubMed: 12406114]
- Gray, L.; Mackie, B.; MacDonald, C.; Paton, D.; Johnston, DM.; Johal, S.; Cunningham, C.; Wenn, J.; Baker, M. Dynamics of an effective risk communication campaign for Influenza A (H1N1). GNS Science; Lower Hutt: 2011. GNS Science Report No. 2011/04
- Harrison AW, Rainer RK, Hochwarter WA, Thompspon KR. Testing the self-efficacy-performance linkage of social-cognitive theory. *Journal of Social Psychology*. 1997; 137(1):79–87. [PubMed: 9121144]
- Hitwise. [accessed May 28, 2011] Search engines. 2010. available at: www.hitwise.com/us/datacenter/main/dashboard-23984.html
- Hovland CI, Weiss W. The influence of source credibility on communication effectiveness. *Public Opinion Quarterly*. 1951; 15(4):635–50.
- Hyer, R.; Covello, V. Effective media communication during global public health emergencies: a WHO field guide. World Health Organization; Geneva: 2005. available at: www.who.int/csr/resources/publications/WHO_CDS_2005_31/en/ [accessed May 8, 2010]
- Institute of Medicine (IOM). *Research Priorities in Emergency Preparedness and Response for Public Health Systems: A Letter Report*. The National Academies Press; Washington, DC: 2008.
- Jones SC. Coverage of breast cancer in the Australian print media – does advertising and editorial coverage reflect correct social marketing messages? *Journal of Health Communication*. 2004; 9(4): 309–25. [PubMed: 15371084]

- Kittler AF, Hobbs J, Volk LA, Kreps GL, Bates DW. The internet as a vehicle to communicate health information during a public health emergency: a survey analysis involving the anthrax scare of 2001. *Journal of Medical Internet Research*. 2004; 6(1):e8. [PubMed: 15111274]
- Kitzinger J. The methodology of focus groups: the importance of interaction between research participants. *Sociology of Health & Illness*. 1994; 16(1):103–21.
- Kramer MW, Hess JA. Communication rules for the display of emotions in organizational settings. *Management Communication Quarterly*. 2002; 16(1):66–80.
- Lazarsfeld, PF.; Berelson, B.; Gaudet, H. *The People's Choice*. 2. Columbia University Press; New York, NY: 1948.
- Loges WE. Canaries in the coal mine. *Communication Research*. 1994; 21(1):5–23.
- Lowrey W. Media dependency during a large-scale social crisis: the case of September 11. *Mass Communication Society*. 2004; 7(3):339–57.
- McCombs ME, Shaw DL. The agenda-setting function of mass media. *Public Opinion Quarterly*. 1972; 34(2):167–87.
- Maxwell, JA. *Qualitative Research Design*. 2. Sage Publications; Thousand Oaks, CA: 1990.
- Maxwell, JA. *Qualitative Research Design: An Interactive Approach*. 2. Sage Publications; Thousand Oaks, CA: 2005.
- Merton, R.; Fiske, M.; Kendall, P. *The Focused Interview: A Manual of Problems and Procedures*. 2. MacMillan; New York, NY: 1990.
- Nelkin D. An uneasy relationship: the tensions between medicine and the media. *Lancet*. 1996a; 347(9015):1600–3. [PubMed: 8667872]
- Nelkin, D. *Selling Science: How the Press Covers Science and Technology*. Freeman and Company; New York, NY: 1996b.
- Neumann G, Noda T, Kawaoka Y. Emergence and pandemic potential of swine-origin H1N1 influenza virus. *Nature*. 2009; 749(7249):931–9. [PubMed: 19525932]
- Peterson, C.; Maier, SF.; Seligman, ME. *Learned Helplessness: A Theory for the Age of Personal Control*. Oxford University Press; New York, NY: 1993.
- Pew Internet and American Life Project. [accessed November 22, 2009] Where Americans are turning for flu facts?. 2009. available at: www.pewinternet.org/Media-Mentions/2009/Where-Americans-Are-Turning-for-Flu-Facts.aspx
- Pryor JH, Martin MT, Whitney CG, Turco JH, Baumgartner YY, Zegans ME. Rapid response to a conjunctivitis outbreak: the use technology to leverage information. *Journal of American College Health*. 2005; 50(6):267–71. [PubMed: 12701651]
- Quick B. The effects of viewing Grey's Anatomy on perceptions of doctors and patient satisfaction. *Journal of Broadcasting and Electronic Media*. 2009; 53(1):38–55.
- Seeger, MW.; Sellnow, T.; Ulmer, RL. *Crisis Communication and the Public Health*. Hampton Press; Cresskill, NJ: 2008.
- Self, CS. Credibility. In: Salwen, M.; Stacks, D., editors. *An integrated approach to communication theory and research*. Erlbaum; Mahwah, NJ: 1996.
- Shaw R, McCombs M. A look at agenda-setting: past, present and future. *Journalism Studies*. 2005; 6(4):543–57.
- Stoto, MA. *Encyclopedia of Quantitative Risk Analysis and Assessment*. John Wiley & Sons, Ltd; Hoboken, NJ: 2008. Public Health Surveillance.
- Strauss, A.; Corbin, J. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. Sage Publications; Thousand Oaks, CA: 1998.
- US Department of Health & Human Services (USDHHS). Duncan, Sebelius unveil new CDC H1N1 guidance for colleges, universities, and institutions of higher education. USDHHS; 2009 Aug 20. available at: www.hhs.gov/news/press/2009pres/08/20090820a.html [accessed March 10, 2010]
- Weiner, B. *An Attributional Theory of Motivation and Emotion*. Springer; New York, NY: 1986.
- Wray RJ, Becker SM, Henderson N, Glik D, Jupka K, Middleton S, Henderson C, Drury A, Mitchell EW. Communicating with the public about emerging health threats: lessons from the pre-event message development project. *American Journal of Public Health*. 2008; 98(12):2214–22. [PubMed: 18382011]

Biographies

Alexis Koskan is currently a Postdoctoral Research Fellow at Moffitt Cancer Center. She is currently engaged in collaborative research projects related to health communication, cancer disparities, and biospecimen research. Alexis Koskan is the corresponding author and can be contacted at: alexis.koskan@gmail.com

Caroline Foster is a third-year PhD student in the University of South Carolina's School of Journalism and Mass Communications. Her research interests include health communication, new media and public understanding of science. She is currently working as a Student Research Project Manager on a \$250,000 grant exploring perceptions about clinical trials, especially in rural South Carolina. She formerly worked as Editor of *South Carolina Wildlife* magazine, where her love of science communication began. While on the magazine staff, she earned her MA in Journalism and Mass Communications at the University of South Carolina focusing on tendency to action on environmental causes among readers of state wildlife magazines.

Jack Karlis is pursuing his PhD in Mass Communications. He is in his third year of doctoral work. His professional experience includes publication in several daily newspapers around the USA (New York, South Carolina, Florida and California), working in the online outlet of a print newspaper, public relations for a school district, and the business side of television. His research interests include new media technologies, media convergence, and journalism and mass communication curriculum.

India Rose, MPH is a doctoral candidate in the Department of Health Promotion, Education, and Behavior at the University of South Carolina. Her research focuses on utilizing health communication strategies to address health disparities among minority populations.

Andrea Tanner, PhD, is an Associate Professor in the School of Journalism and Mass Communications at the University of South Carolina. Her research evaluates how media present health information and how mass communication can be utilized to promote healthy behavior and public awareness of health issues.

Appendix 1. IRB approval letter: H1N1 research study focus groups

Study purpose: this activity is a series of focus groups to help gather information about college students' response to H1N1 (swine flu) on the USC campus. We are interested in learning how students seek and process information about H1N1 as well as preventive measures they practice to avoid H1N1. We will also examine college students' preferred communication channel for receiving health pandemic and emergency preparedness information.

Your involvement: we are inviting you to participate in a focus group about your knowledge, attitudes, and beliefs about H1N1. Focus groups will be held in the CEO room at the University of South Carolina's School of Journalism and Mass Communications,

Carolina Coliseum between the dates Monday, October 26 – Friday, October 30. Your participation is completely voluntary.

Confidentiality: your name will not be associated with your answers provided in the H1N1 focus groups. No identifying information from the short demographic questionnaire will be reported or shared.

Your rights: your answers are important, and you are allowed to choose whether or not you would like to answer all of the questions or to leave the study at any moment. Your decision to participate in this focus group will not affect your current or future relationship with the University of South Carolina, the Arnold School of Public Health, or the School of Journalism and Mass Communications.

Possible risks: there are no identifiable risks. Your answers will not be associated with your name.

Possible benefits: the information from these focus groups may not benefit you directly. However, your responses may assist health practitioners and health communication specialists to inform the college-aged community how best to prepare and respond to a health crisis, particularly a flu pandemic.

Appendix 2

Plate A1.
H1N1 campus poster