

# Channel Complementarity Theory and the Health Information-Seeking Process: Further Investigating the Implications of Source Characteristic Complementarity

Communication Research

XX(X) 1–21

© The Author(s) 2013

Reprints and permissions:

[sagepub.com/journalsPermissions.nav](http://sagepub.com/journalsPermissions.nav)

DOI: 10.1177/0093650213510939

[crx.sagepub.com](http://crx.sagepub.com)



Stephen A. Rains<sup>1</sup> and Erin K. Ruppel<sup>2</sup>

## Abstract

The contemporary information-seeking environment is marked by the presence of more information sources than perhaps ever before. Moreover, in the context of health information, evidence suggests that information seekers utilize multiple sources—such as health care providers, print media, and online support groups—in the process of acquiring information. Two studies were conducted to investigate the role of information sources in the health information-seeking process and test Ruppel and Rains's (2012) extension of channel complementarity theory. Four complementarity characteristics of sources, which are argued to serve as a basis for source use during information seeking, were examined: access to medical expertise, tailorability, anonymity, and convenience. Taken together, the results from both studies offer some evidence that sources are used systematically during health information seeking based on each of the four complementarity characteristics.

## Keywords

channel complementarity theory, information seeking, health communication

---

<sup>1</sup>University of Arizona, Tuscon, USA

<sup>2</sup>University of Wisconsin-Milwaukee, USA

## Corresponding Author:

Stephen A. Rains, Department of Communication, University of Arizona, Tuscon, AZ 85721-0025, USA.

Email: [srains@email.arizona.edu](mailto:srains@email.arizona.edu)

Contemporary information seekers have access to more sources for acquiring information than perhaps ever before in history. Due in part to the widespread diffusion of new communication technologies, it is often possible to gather information about a given topic or issue from sources ranging from likeminded others in online communities and A-list bloggers to more traditional outlets such as newspapers and licensed professionals (Case, 2012; Case, Johnson, Andrews, Allard, & Kelly, 2004). It is not surprising that the source of information is a consideration in several theories of information seeking developed by communication scholars. The comprehensive model of information seeking (Johnson & Meischke, 1993) and risk information seeking and processing model (Griffin, Dunwoody, & Neuwirth, 1999) are frameworks that account for the implications of the specific source selected to acquire information. In each of these models, several factors are presumed to influence source selection and, in turn, information-seeking outcomes.

Although the source of information has been identified as one important factor among many, the contemporary information-seeking environment in which a plethora of sources might provide information about a particular topic or issue makes it critical to examine how individuals navigate multiple sources in the process of searching for information. The context of health information seeking offers an ideal setting in which to conduct such an endeavor. One may acquire health information from a range of sources such as newspapers (Niederdeppe, Frosch, & Hornik, 2008), magazines (Gill & Babrow, 2007), television (Wang & Gantz, 2010), friends and family (Ford & Kaphingst, 2009), websites (Rains, 2007), online support groups (Tanis, 2008), and medical professionals (Pecchioni & Sparks, 2007). Moreover, there is ample evidence that individuals may consult multiple sources when searching for health information (Broom, 2005; Kivits, 2004; McCaughan & McKenna, 2007; Nettleton, Burrows, & O'Malley, 2005). Examining the process through which individuals select and use multiple sources when acquiring health information can help us more fully understand the role of sources in information-seeking behavior.

Channel complementarity theory (Dutta-Bergman, 2004a) is one theoretical framework that offers insight into the use of multiple sources during information seeking. Channel complementarity theory is rooted in the basic notion that individuals who are motivated to acquire information about a topic or issue will use all sources that are perceived to fulfill that information need. Ruppel and Rains (2012) extended channel complementarity theory by identifying four complementarity characteristics of health information sources that function as a basis for source use during information seeking. The four complementarity characteristics were tailored specifically to health information sources and included the degree to which a source is convenient, anonymous, provides tailored information, and offers access to medical expertise. Ruppel and Rains contended that sources that possess relatively greater amounts of each of the four characteristics are used complementarily during the process of acquiring health information.

The purpose of the present project is to test the extension of channel complementarity theory proposed by Ruppel and Rains (2012). Two studies were conducted in an effort to further evaluate the four complementarity characteristics as explanations for

systematic source use during health information seeking. The results of the two studies offer insights into the viability of the extension to channel complementarity theory proposed by Ruppel and Rains. More generally, this project helps better understand information-seeking behavior by considering the process through which individuals use multiple sources to acquire information. In the following paragraphs, channel complementarity theory is reviewed to provide a foundation for discussing the two studies.

## Literature Review

### *Channel Complementarity Theory*

Channel complementarity theory (Dutta-Bergman, 2004a, 2006) was constructed in response to arguments that new(er) communication media—in particular, Internet-based technologies—displace old(er) media technologies. The theory is founded on ideas from selective exposure theory (Zillmann & Bryant, 1985), uses and gratifications (Blumler & Katz, 1974), and dual-process theories of message processing (Chaiken, 1987; Petty & Cacioppo, 1986) and assumes that source use results from an enduring involvement in message content. The central postulate of the theory is that individuals will use any available source that satisfies their need for content. Dutta-Bergman (2004a) noted that “people consuming one particular medium to gather information in one particular area are likely to consume other media that contain information in that specific area” (p. 48). In the context of health information seeking, researchers have found evidence consistent with channel complementarity theory (Tian & Robinson, 2008a, 2008b). Tian and Robinson (2008b), for example, reported positive relationships between visiting a health care provider and attending to health information from sources such as television, newspapers, and the Internet.

Dutta-Bergman (2006) conceptualized the construct of complementarity largely in terms of content. Sources are complementary to the degree that they provide similar content such as information about health (Tian & Robinson, 2008b), sports (Dutta-Bergman, 2004a), or even access to social support (Dutta-Bergman, 2004b). Ruppel and Rains (2012) took issue with this conceptualization of complementarity, arguing that it makes focused predictions within a given content domain impossible. Within the context of health, for example, channel complementarity theory is limited to the general prediction that an information seeker will use all possible sources that provide information about the particular health issue of interest. Yet a plethora of sources exist that might provide information about health. Knowing that an information seeker could use any or all possible health information sources—such as friends, family members, newspapers, magazines, various television programs (e.g., news, medical dramas), online support groups, in-person support groups, blogs, health portal websites (e.g., WebMD), doctors, nurses, and so on—has relatively limited utility for scholars and practitioners.

As opposed to focusing on source content, Ruppel and Rains (2012) contended that using source characteristics as a basis for determining source complementarity makes it

possible to advance channel complementarity theory and allow more focused predictions about source use within a particular content domain. In domains such as health, where a multitude of sources may be available, sources may be used complementarily during information seeking based on salient source characteristics. Source characteristics are defined as “the relatively enduring structural or technical features of a source” (Ruppel & Rains, 2012, p. 388). The authors note that sources can have multiple characteristics and that the most salient characteristics likely depend on the broader information-seeking context (e.g., health). Focusing on source characteristics as a basis for complementarity makes it possible to move beyond the general prediction that all sources that provide health information will be selected by an information seeker and make more specific predictions about those sources that are more or less likely to be used. Sources that possess greater levels of a given complementarity characteristics should be more likely to be used complementarily during a health information search.

Drawing from the literature on health information seeking, Ruppel and Rains (2012) proposed and evaluated four complementarity characteristics relevant specifically to the context of acquiring health information. *Access to medical expertise* involves the degree to which a source makes it possible to gain access to individuals with formal medical training or licensing. *Tailorability* refers to the degree to which a source makes it possible to acquire information that is unique to one’s circumstance or situation. *Anonymity* involves the degree to which a source makes it possible for one to acquire information without revealing one’s identity. *Convenience* refers to the ease associated with accessing and using a source. Ruppel and Rains argued that sources may be used systematically during the information-seeking process based on each of the four complementarity characteristics.

Ruppel and Rains (2012) used secondary data from the Health Information National Trends Survey (HINTS; National Cancer Institute, 2009) to test their predictions about complementary source use. They examined data from approximately 3,500 HINTS respondents who reported seeking health information during the previous year and using more than one source during their search. The authors classified all sources used by HINTS respondents as being relatively higher or lower in each of the four complementarity characteristics and examined complementary source use at the level of the overall search and among pairs of sources (e.g., complementarity between the first and second source selected, between the second and third source selected, etc.). Complementary source use was operationalized as occurring when respondents reported using sources that were high in a given complementarity characteristic during a search. Ruppel and Rains reported that, overall, respondents used sources high in tailorability complementarity, anonymity complementarity, and convenience complementarity at a greater rate than would be expected by chance. Examining complementarity at the level of source pairs, which offered a more rigorous test of their predictions, sources high in tailorability and anonymity complementarity were used at a greater rate than would be expected by chance. In summary, the results of Ruppel and Rains’s investigation offer some evidence for the utility of conceptualizing complementarity in terms of source characteristics. Their findings suggest that sources are used strategically during the information-seeking process based on three of the four complementarity characteristics.

## *The Present Project*

The goal of the present project is to further test the viability of examining complementarity in terms of source characteristics and, more specifically, the four complementarity characteristics proposed by Ruppel and Rains (2012). To this end, two studies were conducted. The first consists of a cross-sectional survey designed to replicate Ruppel and Rains's key predictions using respondents' perceptions of the four complementarity characteristics. The second study consists of an experiment constructed to demonstrate systematic variation in source use based on the four complementarity characteristics. Each study will be presented separately in the subsequent pages, followed by a general discussion of the findings.

## **Study I**

Using channel complementarity theory as a framework to investigate health information-seeking behavior makes it possible to better understand the process through which individuals acquire information. As previously noted, Ruppel and Rains (2012) identified four characteristics of health information sources that they argued might function as a basis for source complementarity. They found evidence suggesting that health information seekers use sources systematically at the level of the search as a whole based on three of the complementarity characteristics: tailorability, anonymity, and convenience. In addition, when examining source pairs, they reported that source pairs were used systematically based on tailorability and anonymity complementarity.

Although Ruppel and Rains (2012) found some evidence that individuals used health information sources systematically based on three of the four complementarity characteristics, their study is not without limitations. Most notably, Ruppel and Rains classified sources as higher or lower in a given characteristic based on prior research and did not account for respondents' perceptions of the characteristics. It is possible that some information seekers' perceptions might have differed from the way in which sources were classified by the authors. Replicating Ruppel and Rains's results while accounting for information seekers' perceptions of the degree to which sources possess each of the four characteristics would allow scholars and practitioners to have greater confidence in the four characteristics and their importance to source use during the health information-seeking process.

A second limitation stems from the authors' use of secondary data and, more specifically, the relatively limited range of sources with medical expertise included in HINTS. The authors found that complementary use of sources higher in access to medical expertise was lower than what would be expected by chance. However, only two sources were included in HINTS that the authors classified as being higher in access to medical expertise (i.e., doctor and alternative health practitioner). As such, it seems plausible that the results regarding access to medical expertise complementarity might have been an artifact of the relatively limited number of high-expertise sources available in the HINTS questionnaire. Considering a broader range of sources that might be perceived as providing access to medical expertise would allow for a more

effective test of access to medical expertise as a complementarity characteristic of health information sources.

The primary objective of this study is to replicate Ruppel and Rains's (2012) findings while addressing the key limitations of their project. To this end, source complementarity is treated as a perceptual variable rooted in information seekers' perceptions that a given source is relatively high or low in each of the four complementarity characteristics. In addition, a broader range of response options is included to be more representative of the sources information seekers may use in the process of acquiring health information. As Ruppel and Rains predicted, sources are expected to be used complementarily during a search based on the four complementarity characteristics. That is, the sources perceived to be high in each of the four complementarity characteristics are expected to be used during a search at a rate greater than would be expected by chance. Exceeding the rate of use expected by chance offers evidence that source use is systematic.

In addition to examining the overall proportion of sources used that are high in a given characteristic, complementary source use is examined at the level of source pairs. As Ruppel and Rains (2012) contended, examining source pairs is a more rigorous test of each of the four complementarity characteristics. If a given characteristic is a salient reason for source use, it would be expected that adjacent sources used during a search (e.g., the second and third sources selected) would both be high in that complementarity characteristic. As information seekers move from one source to the next, high levels of a given characteristic should be a factor motivating source selection. Accordingly, we expect use of complementary source pairs based on each of the four complementarity characteristics to be greater than what would be expected by chance. The following two hypotheses are proposed to evaluate the four complementarity characteristics:

**Hypothesis 1:** The overall proportion of sources that are complementary in regard to (a) access to medical expertise, (b) tailorability, (c) anonymity, and (d) convenience used during a health information search is greater than would be expected by chance.

**Hypothesis 2:** The proportion of source pairs that are complementary in regard to (a) access to medical expertise, (b) tailorability, (c) anonymity, and (d) convenience used during a health information search is greater than would be expected by chance.

## *Method*

*Recruitment procedure and participants.* A referral procedure was used to identify potential participants. Undergraduate students were awarded extra credit for referring one individual who was at least 18 years old and not a student or employee of the university at which the study was conducted. The researchers emailed all potential participants with an invitation to participate and a link to the study questionnaire. A total of 352 participants completed the survey. However, 28 participants were removed

from the sample for not having sought health information during the previous 12 months. To ensure the fidelity of the sample, an additional 5 participants were removed because they took less than one third of the median time to complete the survey (<6 minutes). One third of the median time was judged by the authors to be the absolute minimum amount of time in which one could mindfully complete the questionnaire. The remaining 319 participants were included in the analyses.

Participants reported a mean age of 39.38 ( $SD = 15.26$ ); 206 (64.6%) participants were female and 112 (35.1%) were male (1 participant declined to report his or her sex). Participants reported their highest level of education as follows: 1% had completed less than high school, 9% had completed high school, 30% had completed some college, 38% had completed college, 6% had completed some graduate school, and 15% had completed graduate school. Participants reported that their current health was relatively good ( $M = 5.91$ ,  $SD = .95$ ), with possible responses ranging from 1 (*very poor*) to 7 (*very good*). Participants reported seeking health information a mean of 2.14 ( $SD = 1.46$ ) times during the previous 12 months.

### Measures

**Health information source use.** Participants were asked to think of the most recent time they had sought health information and to report the first source they used during their search. After they reported the first source they used, participants were asked to report the second source they used or to indicate that they had not used any other sources. This process continued for each subsequent source participants used until they reported that they had not used any more sources or after they reported their 12th information source. Participants reported using between 1 and 12 health information sources ( $M = 2.66$ ,  $SD = 1.86$ ) during their most recent health information search.

Participants were presented with a list of 16 health information sources representing an expanded version of the sources used in the HINTS survey conducted by the National Cancer Institute (2009). Possible responses included book, brochure or pamphlet, complementary or alternative health provider (e.g., chiropractor, acupuncturist, etc.), family member, friend, in-person support group, magazine, medical specialist (e.g., oncologist, neurologist, etc.), mental health professional (e.g., psychiatrist, psychologist), newspaper, nurse, online support group, primary care (or “family”) doctor, radio, television, or website (that is not a version of a print newspaper or magazine). Participants were allowed to report using each source multiple times during their search. The relative frequency with which each source was used is reported in Table 1.

**Source characteristic complementarity.** After identifying the sources used during their most recent search, participants were asked to rate their perceptions of all 16 sources using items created by the authors to evaluate each of the four complementarity characteristics. Two items were created to evaluate each complementarity characteristic. For *access to medical expertise* complementarity, the items included “Makes it possible for me to get health information from medical experts,” and “Allows me to find health information that comes from medical experts.” For *tailorability* complementarity, the items included “Allows me to find health information that is tailored to my specific questions,” and “Allows me to find health information that takes my

**Table 1.** Frequency of Health Information Source Use in Study 1.

Source	Percentage of all sources used
Book	4.83
Brochure or pamphlet	4.48
Complementary or alternative health provider	2.71
Family member	9.08
Friend	7.78
In-person support group	1.18
Magazine	4.25
Medical specialist	10.02
Mental health professional	1.06
Newspaper	1.53
Nurse	2.95
Online support group	2.36
Primary care doctor	8.49
Radio	0.59
Television	2.00
Website	36.67

specific situation into account.” For *anonymity* complementarity, the items included “Allows me to hide my identity from others when I’m trying to find health information,” and “Allows me to try to find information without other people knowing who I am.” Finally, for *convenience* complementarity, the items included “Allows me to easily find health information I need at the time that I need it,” and “Requires little effort to get the health information I want when I want it.” Possible responses ranged from 1 (*strongly disagree*) to 7 (*strongly agree*). Means and standard deviations for each characteristic and health information source are reported in Table 2.

## Results

**Hypothesis 1: Overall complementary source use.** Hypothesis 1 predicted that participants would use sources complementarily based on the four complementarity characteristics. The data used to test this hypothesis consisted of the sources participants used the last time they sought health information and participants’ ratings of each source based on the four complementarity characteristics. To evaluate complementary source use, each source used by participants was dichotomized as either higher or lower in each of the four complementarity characteristics based on participants’ ratings. Sources that participants rated higher than the scale midpoint (i.e., greater than 4) on a given characteristic were coded as higher in that characteristic and assigned a score of 1; sources rated as equal to or lower than the midpoint of the scale (i.e., less than or equal to 4) were coded as lower in that characteristic and assigned a score of 0. Overall complementary source use for each characteristic was calculated by computing the

**Table 2.** Perceptions of Health Information Sources in Study 1.

Source	Source complementarity characteristic			
	Access to medical expertise	Tailorability	Anonymity	Convenience
Book	4.74 (1.24)	4.24 (1.40)	5.23 (1.53)	4.20 (1.52)
Brochure or pamphlet	4.44 (1.27)	4.07 (1.38)	4.99 (1.54)	4.14 (1.44)
Complementary or alternative health provider	5.38 (1.43)	5.27 (1.37)	3.50 (1.62)	4.14 (1.54)
Family member	3.23 (1.66)	3.81 (1.48)	2.76 (1.65)	3.83 (1.36)
Friend	3.03 (1.58)	3.64 (1.46)	2.52 (1.52)	3.63 (1.38)
In-person support group	4.08 (1.34)	4.50 (1.27)	2.89 (1.44)	4.05 (1.31)
Magazine	3.87 (1.41)	3.25 (1.39)	5.41 (1.39)	3.80 (1.42)
Medical specialist	6.04 (1.09)	5.87 (1.04)	4.13 (1.90)	4.70 (1.43)
Mental health professional	5.74 (1.28)	5.43 (1.30)	4.15 (1.87)	4.52 (1.43)
Newspaper	3.43 (1.46)	2.83 (1.39)	5.33 (1.44)	3.29 (1.44)
Nurse	5.37 (1.18)	5.21 (1.08)	3.89 (1.72)	4.66 (1.33)
Online support group	4.07 (1.49)	4.56 (1.30)	4.64 (1.55)	4.55 (1.25)
Primary care doctor	5.96 (1.11)	5.87 (1.08)	4.12 (1.98)	4.96 (1.36)
Radio	3.37 (1.43)	2.55 (1.29)	5.11 (1.59)	2.79 (1.33)
Television	3.63 (1.48)	2.59 (1.35)	5.37 (1.54)	2.97 (1.37)
Website	4.89 (1.32)	5.08 (1.35)	5.77 (1.36)	5.85 (1.15)

Note. Standard deviations are in parentheses. Ratings range from 1 to 7 with larger numbers indicating more of a given characteristic.

proportion of sources participants used that were higher in that characteristic. Because complementary source use requires, at minimum, the use of two sources, these proportions were only calculated for participants who reported using at least two sources in their most recent health information search ( $N = 236$ ). Although it is not ideal to dichotomize continuous data, it is not possible to conduct a formal test to determine whether complementary source use was systematic for a series of sources rated using continuous measures. Dichotomizing sources as high or low based on participants' ratings offered the most feasible means of testing the hypotheses.

To test the hypothesis that sources are used complementarily overall, the proportion of sources used by participants that were higher in a given complementarity characteristic was compared with the proportion of sources higher in each characteristic that would be expected by chance. If source use is not complementary with regard to a given characteristic, one would expect approximately half (i.e., a proportion of 0.50) of the sources each participant uses to be higher in a given characteristic. Therefore, the proportion of sources participants used that were higher in each characteristic was compared with the chance proportion of 0.50 using one-sample  $t$  tests. The proportion of sources used that were higher in a given source characteristic was greater than

chance for all four source characteristics: access to medical expertise ( $M = 0.66$ ,  $SD = 0.34$ ),  $t(233) = 7.31$ ,  $p < .001$ ; tailorability ( $M = 0.76$ ,  $SD = 0.32$ ),  $t(234) = 12.55$ ,  $p < .001$ ; anonymity ( $M = 0.60$ ,  $SD = 0.33$ ),  $t(234) = 4.74$ ,  $p < .001$ ; and convenience ( $M = 0.69$ ,  $SD = 0.31$ ),  $t(235) = 9.68$ ,  $p < .001$ . Hypothesis 1 was supported.

**Hypothesis 2: Use of complementary source pairs.** Hypothesis 2 predicted that complementary source use would be observed at the level of source pairs. Source pairs consisted of two sources used in consecutive order by a participant. For example, a participant who used four sources would have three source pairs—his or her first and second sources (Pair 1), second and third sources (Pair 2), and third and fourth sources (Pair 3). For each participant, source pairs were coded as complementary in a given source characteristic when that participant rated both sources in the pair as higher than the scale midpoint for the characteristic; complementary source pairs were assigned a value of 1. When one or both sources in the pair were rated as lower than or equal to the scale midpoint in the characteristic, the source pair was coded as noncomplementary and assigned a value of 0. The proportion of complementary source pairs was then calculated for each participant. As with Hypothesis 1, only participants who reported using two or more sources were included in the analyses.

To test Hypothesis 2, the proportion of complementary source pairs was compared with the proportion of complementary source pairs expected by chance. For each source pair, four possible outcomes exist—either both sources are higher in the characteristic, both sources are lower in the characteristic, the first source is higher and the second source is lower in the characteristic, or the first source is lower and the second source is higher in the characteristic. Because only one of these four possible outcomes reflects complementary source use, if source use were random, we would expect that approximately 25% of source pairs would be complementary by chance alone. Therefore, we compared the proportion of complementary source pairs participants reported using in their health information searches to the chance proportion of 0.25 using one-sample  $t$  tests. The results indicated that the proportion of source pairs used that were complementary was greater than chance for all four source characteristics: access to medical expertise ( $M = 0.45$ ,  $SD = 0.46$ ),  $t(224) = 6.50$ ,  $p < .001$ ; tailorability ( $M = 0.55$ ),  $SD = 0.47$ ,  $t(208) = 9.26$ ,  $p < .001$ ; anonymity ( $M = 0.36$ ,  $SD = 0.44$ ),  $t(228) = 3.83$ ,  $p < .001$ ; and convenience ( $M = 0.47$ ,  $SD = 0.46$ ),  $t(225) = 7.11$ ,  $p < .001$ . Hypothesis 2 was supported.

## Study 2

The purpose of Study 1 was to replicate the findings from Ruppel and Rains's (2012) study, while also addressing some of the key limitations of their project. The objective of Study 2 is to further evaluate their extension of channel complementarity theory by examining the notion that sources are used systematically during a health information search based on the four complementarity characteristics. It is plausible that some forms of complementarity are more or less important in certain situations. There may be instances, for example, when anonymity complementarity is unimportant and convenience complementarity is very important. As such, manipulating factors that make

some forms of complementarity more or less salient offers a means to further demonstrate that sources are used systematically based on a given complementarity characteristic. The results of such a test could provide evidence that information seekers are sensitive to the different forms of complementarity when selecting and using sources during the health information-seeking process. One factor that might influence the salience of the four complementarity characteristics is the threat posed by a health condition. This factor will be considered in the following paragraphs to provide a foundation for the hypotheses tested in Study 2.

Threat is an important construct in health communication. Threat, which involves perceptions of one's susceptibility to and the severity of a health-related hazard, is a key component in the health belief model (Rosenstock, 1974), risk perception attitude framework (Rimal & Real, 2003), and extended parallel process model (Witte, 1992). In each of these three models, threat is a central predictor of health behavior. Information seeking is one such threat-motivated health behavior that has been examined in previous research (e.g., Johnson & Meischke, 1993; Turner, Rimal, Morrison, & Kim, 2006). Although there may be some variability in individuals' responses to threat (Brashers, Goldsmith, & Hsieh, 2002), there is reason to believe that threat can promote information seeking (So, 2013). Neuwirth, Dunwoody, and Griffin (2000), for example, conducted an experiment and found that participants in the high threat condition were more motivated to seek information about a health hazard than were participants in the low threat condition. Information seeking can serve as a means to mitigate a health-related threat (Rimal & Turner, 2009).

It is plausible that the degree to which a health issue is perceived to be threatening could influence the salience of the four complementarity characteristics and subsequent use of sources that are perceived to possess these characteristics. Individuals facing a health condition perceived to be threatening should be more inclined to use sources that offer access to medical expertise. Campbell and Roland (1996), for example, applied the health belief model to understand factors motivating individuals to consult a doctor and argued that the perceived severity of one's condition is one possible motivating factor. Experiencing a condition one perceives to be relatively serious should make finding information from medical experts particularly important. Threat should also make tailorability complementarity salient among information seekers. Johnson and Meischke (1991) examined the use of various sources to acquire information about cancer and argued that individuals concerned about the possibility of having cancer are more likely to use specialized and authoritative sources to find individualized information such as treatment strategies. Individuals who perceive greater levels of threat should be more inclined to use sources complementarily based on tailorability complementarity.

It also seems plausible that threat might influence the salience of convenience and anonymity complementarity. A high level of threat should make convenience less salient. Individuals who believe a health condition to be severe should be less concerned with the amount of effort associated with accessing and using a source. As such, individuals who perceive a high level of threat should be less likely to use sources complementarily based on convenience than are individuals who perceive lower levels of threat. Although threat should also impact the use of sources based on

anonymity complementarity, the specific direction of its impact is less clear. Threat may make anonymity more important, as illness might be perceived as a form of weakness that individuals are motivated to conceal. Yet it is equally plausible that threat could make anonymity complementarity relatively unimportant as concerns with one's well-being trump the need to conceal one's identity. Accordingly, high levels of threat, relative to lower levels of threat, could potentially lead to increased or decreased use of sources complementarily based on anonymity complementarity.

The preceding discussion suggests that threat should influence the degree to which sources are used complementarily based on the four complementarity characteristics. Relative to lower levels of threat, higher levels of threat should lead to increased complementary source use based on access to medical expertise complementarity and tailorability complementarity, and decreased complementary source use based on convenience complementarity. In addition, threat should lead to differences in source use based on anonymity complementarity, but the direction of this relationship is unclear. The following hypothesis is forwarded to formally test the relationship between threat and source use based on the four complementarity characteristics.

**Hypothesis 3:** Threat influences the use of sources based on (a) access to medical expertise, (b) tailorability, (c) anonymity, and (d) convenience complementarity during the information-seeking process.

## Method

An experiment was conducted to test Hypothesis 3. Participants were randomly assigned to read a scenario about a health issue in which threat was manipulated. After reading the scenario, participants reported the sources they would use to search for health information and completed measures of source complementarity.

*Recruitment procedure and participants.* The referral procedure used in Study 1 was also used to identify potential participants for this study. A total of 161 participants completed the experiment. Eight participants were removed because they took less than one third of the median time to complete the survey (<7 minutes). Data from the remaining 153 participants were included in the analyses.

The mean age of participants was 38.24 ( $SD = 15.97$ ); 89 participants were female and 61 were male (3 declined to report their sex). Participants reported their highest level of education as follows: 1% had completed less than high school, 8% had completed high school, 30% had completed some college, 39% had completed college, 6% had completed some graduate school, 14% had completed graduate school, and 2% declined to report their education level. Participants rated their current health as fairly good ( $M = 5.84$ ,  $SD = 0.97$ ), with possible responses ranging from 1 (*very poor*) to 7 (*very good*).

*Design.* A 2 (threat)  $\times$  2 (health topic) between-participants design was used in this study. The design was fully crossed. The threat variable consisted of high and low

threat conditions. The health topic variable, which was manipulated to increase the generalizability of the results, consisted of headache and stomach pain/vomiting.

*Procedure.* Participants were randomly assigned to one of the four experimental conditions. In each condition, participants read a scenario in which they were asked to imagine having a set of symptoms related to a headache or stomach pain/vomiting; the scenarios are described in detail in the following section. After reading the scenario, participants were presented with the 16 sources used in Study 1 and asked to report the sources that they would use to search for health information. Participants then completed items evaluating source complementarity and the manipulation check.

*Materials.* Each of the four scenarios followed the same format. Participants were asked to imagine that they had a headache or stomach pain/vomiting during the past 2 weeks while at work. The frequency and duration of the problem were described along with the intensity of the pain, the degree to which the pain affected their work responsibilities, and reactions of their coworkers. All scenarios concluded by stating,

You want to try to find some information about these headaches [this stomach pain and severe vomiting/feeling that you might vomit] so that you can figure out what's going on. In this situation, how would you go about looking for information?

The four scenarios each consisted of 8 sentences and ranged from 126 to 142 words.

Threat was manipulated via the relative severity of symptoms. Susceptibility was held constant; in all conditions, participants were asked to imagine that they were currently experiencing the symptoms described in the scenario. In the high threat conditions, participants were informed that the symptoms occurred every afternoon during the past 2 weeks, last 4 hours and are intense, and are so severe that they interfere with participants' ability to complete the normal tasks in their routine. In the low threat condition, participants were informed that the symptoms occurred three different afternoons during the past 2 weeks, last less than an hour and are mild, and do not interfere with their ability to complete normal tasks in their routine. The nature of the health issue was also manipulated to offer greater confidence that the results are not an artifact of a specific health condition. Headaches and stomach pain with vomiting served as the two health issues. The high threat condition described severe headaches or stomach pain and vomiting; the low threat condition described mild headaches or stomach pain with the feeling that one might vomit. These two issues were selected because they are relatively common and not necessarily symptoms of one specific mental or physical health condition.

### *Measures*

*Health information source use.* The measure of source use from Study 1 was used in this study. Briefly, participants were asked to indicate the first source they would use to seek information in response to the scenario from the list of 16 sources used in Study 1. After reporting the first source, participants were asked to report the second

source they would use or indicate that they would not use any other sources. This process continued until participants reported 12 sources or that they would not use any other sources. As in Study 1, participants were allowed to report using a source multiple times.

*Source characteristic complementarity.* The measures of source characteristic complementarity used in Study 1 were used for this study. For each of the 16 sources, participants completed two items about each of the four complementarity characteristics. Possible responses ranged from 1 (*strongly disagree*) to 7 (*strongly agree*).

*Manipulation check and control variables.* A four-item measure was created for the study to evaluate participants' perceptions of the threat associated with the scenarios. Sample items include "If the situation described in the scenario happened to me, I would consider it a severe health issue," and "I would be very concerned about my health if the situation in the scenario happened to me." Responses were rated on a scale with anchors of 1 (*strongly disagree*) and 7 (*strongly agree*); larger scores indicate greater levels of perceived threat ( $M = 4.37$ ,  $SD = 1.59$ ,  $\alpha = .95$ ). Given the nature of the health topics, we included single-item measures of participants' experiences with headaches and vomiting to be used as control variables. Participants were asked to report the frequency with which they had experienced vomiting ( $M = 1.07$ ,  $SD = 1.40$ ) and headaches ( $M = 2.05$ ,  $SD = 1.33$ ) during the previous 6 months on a scale ranging from 1 (*less than once per month*) to 6 (*daily*). Finally, the number of sources participants reported they would use during their search ( $M = 4.05$ ,  $SD = 2.33$ ) was assessed and used as a control variable to account for differences in participants' tendencies to seek or avoid health information in response to threat.

## Results

*Preliminary analyses.* A manipulation check was conducted to test the efficacy of the threat manipulation. A two-way ANOVA was conducted with threat and health topic serving as the independent variables and perceived threat as the dependent variable. The results indicated that participants in the high threat condition ( $M = 5.35$ ,  $SD = 1.29$ ) perceived the topic to be more severe than did participants in the low threat condition ( $M = 3.60$ ,  $SD = 1.34$ ),  $F(1, 148) = 44.75$ ,  $p < .001$ ,  $\eta^2 = .22$ . Perceived threat also differed by health topic,  $F(1, 148) = 6.86$ ,  $p = .01$ ,  $\eta^2 = .03$ , with the headache condition ( $M = 4.05$ ,  $SD = 1.70$ ) perceived as significantly less severe than the stomach pain/vomiting condition ( $M = 4.64$ ,  $SD = 1.44$ ). No interaction between threat and health topic was observed,  $F(1, 148) = 0.03$ ,  $p = .87$ ,  $\eta^2 < .01$ . Given the difference in perceived threat between the two health topics, health topic and the interaction between threat and health topic were included in the remainder of the analyses to evaluate their potential effects on complementarity scores. In addition, as previously discussed, participants' experience with vomiting and headaches as well as the total number of sources participants selected served as control variables.

**Table 3.** Estimated Marginal Means Among the Four Experimental Conditions in Study 2.

	High threat		Low threat	
	Headache	Stomach pain	Headache	Stomach pain
<b>Overall</b>				
Access to medical expertise	.72 (.29)	.73 (.30)	.69 (.32)	.69 (.22)
Tailorability	.75 (.27)	.72 (.31)	.70 (.26)	.76 (.28)
Anonymity	.53 (.34)	.59 (.33)	.54 (.29)	.55 (.26)
Convenience	.69 (.29)	.70 (.29)	.73 (.26)	.76 (.35)
<b>Source pairs</b>				
Access to medical expertise	.54 (.39)	.57 (.41)	.49 (.41)	.39 (.36)
Tailorability	.58 (.39)	.55 (.41)	.44 (.41)	.58 (.43)
Anonymity	.31 (.41)	.37 (.39)	.23 (.35)	.21 (.35)
Convenience	.48 (.41)	.47 (.41)	.48 (.41)	.70 (.42)

Note. Standard errors are in parentheses. The following variables were controlled in computing the means: experience with headaches, experience with vomiting, and number of sources selected during the search.

*Influence of threat on complementary source use.* Hypothesis 3 predicted that threat influences the use of sources based on (a) medical expertise, (b) tailorability, (c) anonymity, and (d) convenience complementarity during the information-seeking process. Two sets of analyses were conducted to test this hypothesis.

The first set of analyses involved examining differences in overall complementarity scores. Overall complementarity scores, which reflect the overall proportion of sources used during a search that were rated as high in a given characteristic, were calculated using the procedure described in Study 1. Differences in overall complementarity scores were then evaluated using two-way ANCOVA. Threat and health topic served as the independent variables, and number of sources used during the search and participants' experience with headaches and vomiting served as the control variables. The overall complementarity scores for the four characteristics served as the dependent variables. There were no significant main effects of threat for medical expertise complementarity,  $F(1, 140) = 1.91, p = .17, \eta^2 = .01$ ; tailorability complementarity,  $F(1, 140) = 0.50, p = .48, \eta^2 = .003$ ; anonymity complementarity,  $F(1, 140) = 0.62, p = .43, \eta^2 = .004$ ; or convenience complementarity,  $F(1, 140) = 0.25, p = .62, \eta^2 = .002$ . There were also no main effects for health topic nor any two-way interactions. The estimated marginal means, which reflect the means adjusted for the control variables, are reported in Table 3.

The second set of analyses paralleled the first set but examined complementarity scores at the level of source pairs (e.g., Source 1 and Source 2; Source 2 and Source 3, etc.). Examining source pairs offers a more rigorous test of Hypothesis 3 by focusing on whether individuals used sources complementarily as they moved from one source to the next during their search. Complementarity at the level of source pairs was

determined using the procedures outlined in Study 1. As in the first set of analyses for Study 2, differences in complementarity at the level of source pairs were evaluated using two-way ANCOVAs. The results revealed main effects of threat on access to medical expertise complementarity,  $F(1, 129) = 4.72, p = .03, \eta^2 = .03$ , and anonymity complementarity,  $F(1, 129) = 4.06, p = .046, \eta^2 = .03$ . The estimated marginal means, which are reported in Table 3, indicate that participants used a greater proportion of source pairs higher in access to medical expertise complementarity and anonymity complementarity in the high threat condition than in the low threat condition. Although the means were in the expected directions for convenience complementarity,

$F(1, 129) = 1.10, p = .30, \eta^2 = .01$ , and tailorability complementarity,  $F(1, 129) = 1.56, p = .21, \eta^2 = .01$ , the differences were not statistically significant. There were no main effects for health topic nor any interaction effects on any of the four complementarity characteristics. Taken as a whole, these findings offer some evidence consistent with Hypotheses 3a and 3c, but not 3b or 3d.

## Discussion

The purpose of the present project was to examine Ruppel and Rains's (2012) extension of channel complementarity theory (Dutta-Bergman, 2004a) in an effort to better understand the role of information sources during the information-seeking process. The four complementarity characteristics proposed by Ruppel and Rains were tested across two studies. The results of both studies are discussed in the following paragraphs along with their implications for research on channel complementarity theory and information seeking.

### *Source Complementarity Characteristics and Source Use*

The results from Study 1 offer consistent evidence that health information sources are used systematically during the information-seeking process based on all four complementarity characteristics: access to medical expertise, tailorability, anonymity, and convenience. It is notable that respondents reported using sources complementarily based on the four characteristics at the level of the overall search and the level of source pairs. The findings regarding source pairs are particularly important because they offer evidence that complementarity is important as respondents move from one source to the next during a search.

Although the findings from Study 1 regarding anonymity and tailorability complementarity are consistent with Ruppel and Rains's (2012) results, the findings regarding convenience and access to medical expertise complementarity are discrepant. One explanation for these inconsistent findings can be found in the procedures used for designating sources as relatively high or low in each of the four complementarity characteristics. Ruppel and Rains designated sources as relatively high or low based on prior research, whereas complementarity ratings in Study 1 were based on respondents' perceptions. The mean scores reported in Table 2 for each of the four complementarity characteristics reveal that the assignment of sources by Ruppel and Rains

for anonymity, tailorability, and access to medical expertise was generally consistent with the way in which those sources were perceived by respondents in Study 1. Convenience, however, was an exception. Several of the sources categorized by Ruppel and Rains as relatively low in convenience, such as a primary care doctor and books, were rated by respondents in Study 1 as being relatively high in convenience. This discrepancy may explain why the findings from Study 1 are inconsistent with those reported by Ruppel and Rains in regard to convenience complementarity. In addition, Study 1 included several additional sources with medical expertise beyond the two used in Ruppel and Rains's study. The relatively limited range of high-expertise sources in their research may explain why Ruppel and Rains did not find evidence of systematic source use based on access to medical expertise complementarity.

Study 2 was designed to further test the notion that source use varies systematically based on the four complementarity characteristics. Source use was argued to vary as a function of threat. The results of the experiment provide evidence that participants exposed to a relatively greater health threat were more likely to use source pairs high in access to medical expertise complementarity and anonymity complementarity than were participants exposed to a relatively lesser threat. The means regarding tailorability complementarity and convenience complementarity were in the expected directions but not statistically significant. These findings are important because, beyond demonstrating that sources are used at a rate greater than chance, they show that source use varies predictably in response to a factor such as threat. As such, the findings from Study 2 offer evidence that complementarity characteristics are salient to information seekers and an important reason for source use.

There was no main effect of threat on source use for any of the four complementarity characteristics at the level of the overall search in Study 2, although the means were generally in the expected directions. It may be that a ceiling effect for complementary source use made it difficult to detect differences. The means for complementary source use based on each of the four characteristics were noticeably smaller at the levels of source pairs. Examining complementarity at the level of source pairs may have mitigated ceiling effects and made possible a more conservative and effective test for the effects of threat.

### *Theoretical and Practical Implications*

The results of the two studies have several important implications for scholars attempting to better understand information-seeking behavior as well as for health practitioners crafting communication campaigns. First, the findings across both studies offer evidence consistent with the extension of channel complementarity theory proposed by Ruppel and Rains (2012). Within a particular content domain such as health, channel complementarity theory (Dutta-Bergman, 2004a) is limited to the prediction that individuals will use all sources possible that provide health information. Given the plethora of sources that may provide information about health, knowing that any or all sources may be used has relatively limited utility for understanding the nuances of information-seeking behavior. In focusing on source characteristics as a basis for

source use, Ruppel and Rains's extension of channel complementarity theory makes possible more focused predictions about those sources that are more or less likely to be used in a specific content domain. The findings from the two studies conducted for this project offer support for the notion that sources may be used systematically during health information seeking based on the degree to which they are convenient, anonymous, provide tailored information, and offer access to medical expertise.

Second, this project helps advance information-seeking research more generally by offering insights about the role of sources in the process of acquiring information. Although information sources are recognized as an important variable in prior theorizing about information-seeking behavior (e.g., Griffin et al., 1999; Johnson & Meischke, 1993), they are typically considered as one variable among many that contribute to information-seeking outcomes. This project spotlights the role of sources and underscores the notion that information seeking is a process in which several sources may be consulted to acquire information. The results of the two studies demonstrate that trends exist in source use during a search based on source characteristics salient to information seekers. Despite the fact that the source characteristics examined in this project were tailored specifically to the context of health, it seems reasonable that the underlying notion of sources being used systematically during a search based on source characteristic complementarity may apply to other domains (e.g., financial information).

Finally, the results of this project have implications for health practitioners designing communication campaigns. In particular, the complementarity characteristics examined in this project offer a basis for making predictions about the sources individuals might use during a health information search. For health campaign designers, the potential to predict which sources may be more or less likely to be used by information seekers would be valuable. Understanding, for example, that using sources high in anonymity complementarity may be an objective for information seekers because a given health topic is perceived to be severe would help campaign designers more effectively reach their target audience. Campaign designers could attempt to disseminate their messages using sources that offer greater levels of anonymity such as magazines or websites and avoid interpersonal sources that generally lack anonymity. Identifying the complementarity characteristics most likely to be important to a target audience would offer campaign designers guidance in selecting sources and ensuring that they reach their intended audience.

### *Limitations*

Two limitations of this project warrant consideration. First, although examining information seekers' perceptions of complementarity characteristics allows for a more precise understanding of how sources are perceived and used, it also potentially limits the generalizability of the findings. If there is a great deal of inconsistency in peoples' perceptions of sources and characteristics, then the results regarding the complementarity ratings for a given source and characteristic might not generalize to other audiences. However, participants' ratings of the sources and complementarity characteristics

were consistent across both studies and, for the most part, with Ruppel and Rains's (2012) categorization of sources. Future research should examine the relative predictive power of objective and subjective categorizations of sources according to their complementarity characteristics to understand the implications of using each method.

Second, the use of hypothetical scenarios for Study 2 allowed us to manipulate threat while holding other factors constant. However, this method also potentially reduces the ecological validity of the study. For example, the means for access to medical expertise complementarity were fairly high in Study 2. In actual health information-seeking situations, use of sources high in this type of complementarity is likely to be limited by practical concerns such as the financial cost of a visit to a health care provider. Future research should attempt to extend the current experimental findings by examining the role of threat in complementary source use during more naturalistic information searches.

## Conclusion

The significant number of sources from which individuals may acquire health information has important implications for researchers trying to better understand the information-seeking process. This project examined the potential of four source complementarity characteristics to explain the systematic use of health information sources. The results offer some evidence consistent with Ruppel and Rains's (2012) extension of channel complementarity theory. Information seekers appear to recognize and use sources based on the degree to which those sources offer access to medical expertise, tailored information, anonymity, and convenience. Future research is essential to further examine the implications of source complementarity and, ultimately, develop a more complete understanding of the process through which individuals search for information.

## Acknowledgment

The authors thank Professor Roloff and the two anonymous reviewers for their helpful feedback on this project.

## Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

## Funding

The authors received no financial support for the research, authorship, and/or publication of this article.

## References

- Blumler, J. G., & Katz, E. (Eds.). (1974). *The uses of mass communications: Current perspectives on gratifications research*. Beverly Hills, CA: Sage.

- Brashers, D. E., Goldsmith, D. J., & Hsieh, E. (2002). Information seeking and avoiding in health contexts. *Human Communication Research, 28*, 258-271.
- Broom, A. (2005). Virtually he@lthy: The impact of Internet use on disease experience and the doctor-patient relationship. *Qualitative Health Research, 15*, 325-345.
- Campbell, S. M., & Roland, M. O. (1996). Why do people consult the doctor? *Family Practice, 13*, 75-83.
- Case, D. (2012). *Looking for information: A survey of research on information seeking, needs, and behavior*. New York, NY: Emerald.
- Case, D., Johnson, J. D., Andrews, J. E., Allard, S. L., & Kelly, K. M. (2004). From two-step flow to the Internet: The changing array of sources for genetics information seeking. *Journal of the American Society for Information Science and Technology, 55*, 660-669.
- Chaiken, S. (1987). The heuristic model of persuasion. In M. P. Zanna, J. M. Olson & C. P. Herman (Eds.), *Social influence: The Ontario Symposium* (Vol. 5, pp. 3-39). Hillsdale, NJ: Erlbaum.
- Dutta-Bergman, M. J. (2004a). Complementarity in consumption of news types across traditional and new media. *Journal of Broadcasting & Electronic Media, 48*, 41-60.
- Dutta-Bergman, M. J. (2004b). Interpersonal communication after 9/11 via telephone and Internet: A theory of channel complementarity. *New Media & Society, 6*, 659-673.
- Dutta-Bergman, M. J. (2006). Community participation and Internet use after September 11: Complementarity in channel consumption. *Journal of Computer-Mediated Communication, 11*, 469-484.
- Ford, B. M., & Kaphingst, K. A. (2009). Lay interpersonal sources for health information related to beliefs about the modifiability of cancer risk. *Cancer Causes & Control, 20*, 1975-1983.
- Gill, E. A., & Babrow, A. S. (2007). To hope or to know: Coping with uncertainty and ambivalence in women's magazine breast cancer articles. *Journal of Applied Communication Research, 35*, 133-155.
- Griffin, R., Dunwoody, S., & Neuwirth, K. (1999). Proposed model of the relationship of risk information seeking and processing to the development of preventive behaviors. *Environmental Research, 80*(Suppl. 2), S230-S245.
- Johnson, J. D., & Meischke, H. (1991). Women's preferences for cancer information from specific communication channels. *American Behavioral Scientist, 34*, 742-755.
- Johnson, J. D., & Meischke, H. (1993). A comprehensive model of cancer-related information seeking applied to magazines. *Human Communication Research, 19*, 343-367.
- Kivits, J. (2004). Researching the "informed patient": The case of online health information seekers. *Information, Communication, & Society, 7*, 510-530.
- McCaughan, E., & McKenna, H. (2007). Never-ending making sense: Towards a substantive theory of the information-seeking behaviour of newly diagnosed cancer patients. *Journal of Clinical Nursing, 16*, 2096-2104.
- National Cancer Institute. (2009). *Health Information National Trends Survey* [Data file and code book]. Retrieved from <http://hints.cancer.gov>
- Nettleton, S., Burrows, R., & O'Malley, L. (2005). The mundane realities of the everyday lay use of the Internet for health, and their consequences for media convergence. *Sociology of Health & Illness, 27*, 972-992.
- Neuwirth, K., Dunwoody, S., & Griffin, R. J. (2000). Protection motivation and risk communication. *Risk Analysis, 20*, 721-734.
- Niederdeppe, J., Frosch, D. L., & Hornik, R. C. (2008). Cancer news coverage and information seeking. *Journal of Health Communication, 13*, 181-199.

- Pecchioni, L. L., & Sparks, L. (2007). Health information sources of individuals with cancer and their family members. *Health Communication, 21*, 143-151.
- Petty, R. E., & Cacioppo, J. T. (1986). The elaboration likelihood model of persuasion. *Advances in Experimental Social Psychology, 19*, 123-205.
- Rains, S. A. (2007). Perceptions of traditional information sources and use of the World Wide Web to seek health information: Findings from the Health Information National Trends Survey. *Journal of Health Communication, 12*, 667-680.
- Rimal, R. N., & Real, K. (2003). Perceived risk and self-efficacy as motivators of change: Support for the risk perception attitude framework from two studies. *Human Communication Research, 29*, 370-399.
- Rimal, R. N., & Turner, M. M. (2009). Use of the risk perception attitude (RPA) framework for understanding health information seeking: The role of anxiety, risk perception, and efficacy beliefs. In T. D. Afifi & W. A. Afifi (Eds.), *Uncertainty, information management, and disclosure decisions: Theories and applications* (pp. 140-163). New York, NY: Routledge.
- Rosenstock, I. M. (1974). The health belief model and preventive health behavior. *Health Education Monographs, 2*, 354-386.
- Ruppel, E. K., & Rains, S. A. (2012). Information sources and the health information-seeking process: An application and extension of channel complementarity theory. *Communication Monographs, 79*, 385-405.
- So, J. (2013). A further extension of the extended parallel process model (E-EPPM): Implications of cognitive appraisal theory of emotion and dispositional coping. *Health Communication, 28*, 72-83.
- Tanis, M. (2008). Health-related on-line forums: What's the big attraction? *Journal of Health Communication, 13*, 698-714.
- Tian, Y., & Robinson, J. D. (2008a). Incidental health information use and media complementarity: A comparison of senior and non-senior cancer patients. *Patient Education and Counseling, 71*, 340-344.
- Tian, Y., & Robinson, J. D. (2008b). Media use and health information seeking: An empirical test of complementarity theory. *Health Communication, 23*, 184-190.
- Turner, M. M., Rimal, R. N., Morrison, D., & Kim, H. (2006). The role of anxiety in seeking and retaining risk information: Testing the risk perception attitude framework in two studies. *Human Communication Research, 32*, 130-156.
- Wang, Z., & Gantz, W. (2010). Health content in local television news: A current appraisal. *Health Communication, 25*, 230-237.
- Witte, K. (1992). Putting the fear back into fear appeals: The extended parallel process model. *Communication Monographs, 59*, 329-349.
- Zillmann, D., & Bryant, J. (Eds.). (1985). *Selective exposure to communication*. Hillsdale, NJ: Lawrence Erlbaum.

## Author Biographies

**Stephen A. Rains** (PhD, University of Texas at Austin) is associate professor of communication at the University of Arizona. His research examines new communication technologies, health communication, and social influence.

**Erin K. Ruppel** (PhD, University of Arizona) is assistant professor of communication at the University of Wisconsin-Milwaukee. Her research examines communication technologies, health communication, and interpersonal communication.