AN INVESTIGATION OF ONLINE HEALTH SUPPORT GROUPS:

EFFECTS OF NARRATIVE EXPOSURE AND SOCIAL SUPPORT ON THE
EXPERIENCE OF SYMPATHY, SELF-DISCLOSURE AND COGNITIVE CHANGES

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Online health support groups have been increasingly recognized as useful mediums to communicate health information. Previous studies have found that the use of online health support groups is positively related to psychological and physical well-being. However, little research has been conducted to explain why these benefits happen. This study examined how hypothetical first-time users would respond to messages in an online support group about college stress as an attempt to explore why the online health support group participation is related to many health benefits.

Personal stories and empathic messages have been identified as two major genres of messages that people could encounter in online health support groups. An experiment with a 2 (narrative exposure) X 3 (social support) factorial design was conducted to examine how people process these messages. Guided by narrative persuasion theories, narrative engagement including transportation and character identification were previously hypothesized as mediating mechanisms of information processing. However, these hypotheses were not supported. Rather, indirect relationships were found between message exposure and changes in health attitudes and behavioral intentions via sympathy. In addition, the study found that exposure to personal stories and observations about how other people provide support encouraged participants to form their own narratives using the support frame, which was also related to positive persuasion outcomes.

These results demonstrate the potential value of using online health support groups in daily life. Theoretical implications on online health support group research were discussed, followed by practical implications on using online health support groups in health campaigns and for long-term illness management.
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Chapter 1

Introduction

A study recently conducted by Epsilon (2010) found that 40% of online users in America used social media to gather health information. Emotional needs are the primary reason that drives people to use social media. As the study revealed, “Many healthcare social media users want reassurance, support, and a sense of intimacy from people who are going through a similar experience” (Epsilon, 2010). It is likely that this particular need is what sparked the development of self-organized Internet-based health support groups. Users can search for these support groups using any search engine, or they can find them on many popular health websites, such as WebMD.com. People share their health experiences using these support groups and get advice and empathy from others (Preece, 1999). Besides these self-organized support groups, computer-based interventions, such as CHESS (Comprehensive Health Enhancement Support System), are another type of online health support group that is designed and distributed by health professionals. These support groups combine educational and group communication components, making it possible for individuals to access credible health information and communicate with other users at the same time (Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006).

Many patients with chronic conditions have said that online support groups are valuable, and doctors have shown favorability to this particular medium for patient management as well (Arnold, 2010). As a result, an increasing amount of research has been conducted to explore the advantages of online health support groups to manage health experiences. A core research question these studies investigate examines whether Internet-based support groups are effective or superior in providing social support. However, few studies have examined group interactions to explore how support is developed and perceived. Some scholars have argued that with the development of research in this area, the question was not whether the Internet could provide support or not but why the Internet is
such an effective medium to provide social support (Rains & Young, 2009). The answer to this question - namely, how do people process and respond to the messages that they encounter in these groups - should be investigated.

Several content analyses have demonstrated that personal stories and empathic messages are the two major message genres that people encounter when using online health support groups (Preece, 1999; Preece & Ghozati, 2001). Following previous studies, this dissertation specifically examines how people respond to these two types of messages. Would people strive to share their own experiences after reading others' stories? When reading other people's replies, how much would people feel like they are being supported? Voluntary participation in online support health groups is also examined. Besides investigating how existing messages trigger online health support group participation, this study also explores the attributes of these personal responses.

This study’s examination of people's voluntary responses is an important contribution to current research on online health support groups. Still in its infancy, research in this area has focused on establishing the relationship between group use frequency and psychological or physical well-being. However, little research has been conducted to examine the group interactions that actually happen and how these interactions lead to psychological and physical health outcomes. However, this idea is not uncommon in many other health psychology research areas. For example, models have been developed in narrative psychotherapy to examine the optimal structure for patients to construct narratives about traumatic experiences that could lead to better therapy outcomes (Angus & Hardtke, 1994; Angus, Lewin & Hardtke, 1996; Angus, Levitt & Hardtke, 1999; Angus, Lewin, Bouffard & Rotondi-Trevisan, 2004). Some scholars also found that revealing emotions in writing is positively related to stress reduction (Graybeal, Sexton & Pennebaker, 2002; Pennebaker & Seagal, 1999). As an exploratory study on how online health support group use could lead to a variety of psychological and physical benefits, this study, established upon these previous findings, examines
the cognitive changes, emotional changes, and other attributes that appear in the voluntary responses that people generate when participating in online health support groups.

Another contribution of this study is the focus on health attitudes and behavioral intentions as the health outcomes. Numerous health communication paradigms that are popularly used today examine attitudinal and behavioral changes (Ajzen & Fishbein, 1980; Ajzen, 1991; 2002; Dillard & Shen, 2005; Fishbein & Ajzen, 1975; Witte & Allen, 2000). However, this focus has not been widely addressed in the current research on online health support groups. The results of many surveys have suggested that to witness how other people who share similar experiences and manage their problems is an important attraction of online health support groups (Epsilon, 2010, Weinberg, Uken, Schmale & Adamek, 1995; Wright, 2000b, 2002). It indicates that online health support groups not only provide people with a channel for emotional regulation but also provide role models from which people can learn. In particular, many studies have identified the value of online health support groups for patients diagnosed with chronic illnesses (Hill, Schillo & Weinert, 2004; Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006). Thus, it will be interesting to examine how online health support groups can guide people to perform long-term behavioral changes that lead to positive health outcomes.

Therefore, this study examines how people process the messages that they encounter in online health support groups. More importantly, the study explores how people are guided to generate their own responses and how these responses are related to positive changes in health attitudes and behavioral intentions. Chapter 2 reviews the relevant literature related to message processing in online health support groups, including narrative persuasion theories, social support theories, and research on self-disclosure, illness narratives, and health outcomes. Further, the hypotheses and research questions are presented after reviewing each block of relevant literature. Chapter 3 describes how this study was conducted, including what methodology was used, how the
instruments were developed, and what measures for each individual variable were used. Chapter 4 presents the results for each hypothesis and research question. The results from additional analyses are included at the end of the chapter. Finally, Chapter 5 discusses the findings, theoretical implications, and practical implications of this study followed by limitations and possibilities for future research.
Chapter 2

Literature Review

The Power of Narratives

We hear stories related to health every day. Many scholars have found that narratives are effective when used to deliver health information (CDC AIDS Community Demonstration Projects Research Group, 1999; Green, 2006; Hinyard & Kreuter, 2006, Larkey & Gonzalez, 2007). According to Bruner (1986), there are two ways of knowing that complement each other: the paradigmatic/logico-scientific way and the narrative way. The paradigmatic way of knowing verifies truth through judging strengths of arguments, collecting empirical evidence, putting pieces of information into a metaphorically mathematical equation, and drawing conclusions by transcending concrete experiences. The narrative mode of thinking, on the other hand, is aimed at locating experience in a specific time and place and is developed through unfolding a course of actions and consequences. Therefore, in this way of knowing, people comprehend the world by understanding each concrete experience.

Many health campaigns and educational practices utilize narratives, especially the stories of people who survived specific health challenges to inform target groups who share similar health problems and concerns. These practices demonstrate the effectiveness of inviting people into the narrative mode of knowing (Bailey, Erwin, & Belin, 2000; CDC AIDS Community Demonstration Projects Research Group, 1999). The Witness Project is an example of a health campaign successfully engaging people in the narrative way of knowing. This project was developed to establish culturally appropriate role models among African American women for the prevention and early detection of breast cancer and cervical cancer. Survivors of breast or cervical cancer who underwent their own survival experiences shared their stories with other African American women to increase their awareness of the risks of these diseases (Bailey, Erwin, & Belin, 2000). Similarly, the
CDC AIDS Community Demonstration Projects Research Group (1999) designed interventions using the authentic stories of community members to target populations at high risk for developing AIDS. The results revealed that exposure to these stories successfully increased protected sexual behaviors among the intervention groups. Larkey and Gonzalez (2007) also recognized the importance of establishing culturally appropriate role models. They found that storytelling interventions for colorectal cancer prevention was more effective in the Latino population than interventions using numbers to display health information. The storytelling interventions introduced how culturally similar characters changed their behaviors to prevent cancer. After exposure to these stories, Latinos reported significantly greater intentions to add vegetables to their diet and increase daily physical activity.

Green (2006) argued that narratives are advantageous to deliver health information, especially to deliver complicated and frightening medical information. When patients read a narrative story, it is easier for them to generate mental simulations of medical procedures that they may feel to be too complicated to imagine when reading a non-narrative message. As a result, fear and anxiety associated with not being able to create mental images of the medical procedures are reduced. Furthermore, role models for audience members can easily be created through narratives. By immersing themselves into the stories and connecting with the storytellers, the audience members often feel capable of changing their own attitudes and behaviors to reach better health outcomes by following the stories’ role models. Further, Petraglia (2007) argued that narratives can help people package information, recognize new information, create meaning, and make decisions. In other words, human memories consist of narratives, which are the foundations of knowledge (Baesler & Burgoon, 1994; Green & Brock, 2002; Petraglia, 2007).

Despite the potential of using narratives to inform people and facilitate attitudinal and behavioral changes for better health outcomes, the study of personal stories have been limited to
viewing them as a type of evidence presented in persuasive messages under the theoretical framework of dual-process models (Kopfman, Smith, Yun & Hodges, 1998). Dual-process models suggest that argument strength and personal relevance to a persuasive topic influence how people process a persuasive message. People with higher personal relevance to a message topic are more motivated to process the message. Therefore, they tend to take the central route or systematic mode of message processing by scrutinizing the message and producing a greater amount of cognitive elaboration. In this situation, a message containing strong arguments produces greater attitudinal changes than a message containing weak arguments. The attitudinal changes resulting from this type of processing last longer than those changes resulting from the peripheral route or heuristic mode of processing. Conversely, when people have low relevance to a message topic, they are not motivated to process a persuasive message. As a consequence, they will take a peripheral route or perform a heuristic mode of information processing. They won’t scrutinize the message and will be more influenced by contextual cues. When individuals are not motivated to process a message, the message’s argument strength will not make a difference in the amount of cognition. The attitudinal changes that stem from this mode of information processing last only a short period of time compared with the attitudinal changes resulting from systematic processing (Chaiken, 1980; Chen & Chaiken, 1999; Petty & Cacioppo, 1986). Using dual-process models, messages utilizing narrative evidence have been studied in comparison with persuasive messages using statistical evidence. Cognitive elaboration has been considered the major mechanism for message processing. Narrative evidence has been usually considered to be weak arguments compared to statistical evidence (Kopfman, Smith, Yun & Hodges, 1998; Slater & Rouner, 2002).

However, scholars have increasingly disagreed that people generate attitudinal or behavioral changes after reading a story as a result of cognitive elaboration (Green & Brock, 2002; Slater & Rouner, 2002). Theoretically, cognitive elaboration is reflected by the number of both pro-message
and counter-message thoughts when responding to persuasive messages (Kopfman, Smith, Yun & Hodges, 1998). However, when audience members are exposed to narrative messages, they tend to follow the story plots and experience the cognitions and feelings of the media characters. They will temporarily lose access with the world in which they actually live and will, therefore, be less likely to generate arguments based on their real-world experiences (Green & Brock, 2002; Slater, 1997). In addition, as argued before, cognitive elaboration is determined by issue involvement in conventional persuasion models. In other words, whether people feel personally related to a persuasive topic makes a difference when he/she responds to non-narrative persuasive messages. High issue involvement motivates audience members to select the central route or systematic mode of information processing. However, narrative messages, such as those found in television shows, are not only designed for audience members having high issue involvement. Instead, there is the potential for all audience members to be transported into the narrative world depending on how effectively the story is crafted. The transportation experience, meanwhile, has nothing to do with how much the audience members are involved with the stories’ topics. Therefore, different from non-narrative persuasive messages, for narrative-based persuasive messages, transportation and character identification rather than issue involvement is considered the premise of a message’s influence (Green & Brock, 2000, 2002; Slater & Rouner, 2002).

To illustrate this point, Green and Brock (2002) argued that dual-process models are only appropriate for rhetorical persuasion. They defined rhetorically persuasive messages as “the vast variety of messages such as editorials, many advertisements, public education campaigns, and political speeches, in which arguments are adduced on behalf of an advocated opinion or position” (Green & Brock, 2002, p. 320). In other words, rhetorically persuasive messages are non-narrative messages that consist of arguments and evidence, thereby evoking cognitive reasoning. Processing narrative messages, on the other hand, is different (Green & Brock, 2000, 2002; Slater & Rouner,
2002). Scholars have called for a new theory to explain the undergoing process of narrative persuasion. Many of these researchers have made efforts to conceptualize this unique type of audience involvement (Green & Brock, 2002; Hinyard & Kreuter, 2006; Slater & Rouner, 2002; Sood, 2002). The following literature review will start by conceptualizing narratives and the key variables of narrative processing. Also, the theories that have been used to understand narrative processing will be introduced, and the empirical findings will be summarized and discussed.

**Defining narratives**

The power of narratives has been recognized since at least the time of Aesop (Slater, 2002). The use of storytelling to influence people’s attitudes and behaviors is common in both Western and non-Western cultures. While storytelling is a universal phenomenon, it has been difficult for scholars to measure the impact of narratives empirically. One reason for this difficulty might be the incongruent conceptualizations of narratives among researchers.

Many of the current conceptualizations related to narratives follow Bruner’s categorization of the two ways of knowing (Bruner, 1986; Green & Brock, 2002; Hinyard & Kreuter, 2006; Oatley, 2002). As stated before, Bruner (1986) distinguished between paradigmatic and narrative ways of knowing. He suggested that these two ways of knowing are fundamentally different based on their different ways of verifying truth. The narrative mode of knowing specifies the course of actions and consequences of each unique experience. Following this definition, Hinyard and Kreuter (2006) argued that a narrative is “any cohesive and coherent story with an identifiable beginning, middle, and end that provides information about scene, characters, and conflict; raises unanswered questions or unresolved conflict; and provides resolution” (p. 778).

**Drama and entertainment education.** Many scholars have defined drama instead of narratives. For example, Deighton, Romer, and McQueen (1989) viewed drama and arguments as two ends of a continuum. Plots, characters, and narrators are the three criteria used to judge the genre
of communication. Opposite of arguments, a drama is structured by plots and identifiable characters who act within the plots. Furthermore, in an argument, a narrator is present as the entity telling the story, while the events of a drama naturally unfold without a narrator explaining the relevance and causal connections. Following Aristotle’s *Poetics*, Kincaid (2002) agreed that a drama must contain six fundamental elements: action or plot, characters, thought or ideas, verbal expression or language, music or song, and spectacle.

Some scholars tend to refer to fictitious works when defining narratives (Green & Brock, 2002; Green, Garst, Brock & Chung, 2006; Oatley, 2002). This tendency might be partially due to the fact that research on nonfictional narratives dominated traditional persuasion research, even though the superiority of this line of persuasion research over that based on fictional narratives is not evident (Strange & Leung, 1999; Green & Brock, 2000). Oatley (2002) defined fictional narratives as the “mode of thinking about, and understanding, people who are somewhat like ourselves, who act purposefully, meet vicissitudes, and as a result experience emotions so that we readers also experience emotions by identification with them, in sympathy with them, or in other ways” (p. 40). Further, Green, Garst, Brock, and Chung (2006) argued that fictional narratives invite audience immersion, which is a feature of narratives that makes them fundamentally distinguished from non-narratives.

It is not surprising, then, to find that people learn from media narratives. For example, Dal Cin, Gibson, Zanna, Shumate, and Fong (2007) found that people who smoked and identified with a hero character who smoked in a film clip reported significantly higher intentions to smoke in the future. To educate the public, the entertainment-education approach takes advantage of the fact that the majority of the U.S. culture spends a great deal of their leisure time watching entertainment programs. According to Singhal and Rogers (1999), entertainment-education is “the process of purposely designing and implementing a media message both to entertain and educate, in order to
increase audience members’ knowledge about an educational issue, create favorable attitude, and change overt behavior” (p. 9).

Drama theory and social cognitive theory explain the impact of entertainment-education programs on attitudinal and behavioral changes (Bandura, 1986, 2002; Kincaid, 2002; Moyer-Gusé, 2008). In drama, characters experience attitudinal and behavioral changes through intense emotional pressure after confrontations. As plots unfold, audience members experience the same attitudinal and behavioral changes by identifying with the characters (Kincaid, 2002). Cohen (2001) defined identification with characters as a process of thinking through the perspective of the characters and feeling with the characters. Slater and Rouner (2002) argued that identification with characters was the result of individuals’ absorption into the narrative world of the drama. In other words, drama theory asserts that education is achieved by carefully constructing narratives and inviting audience members to experience the story with the characters of the drama.

Social cognitive theory is a theory about observational learning (Bandura, 1986). Bandura (2002) argued there are four sub-processes that govern people’s observational learning: attention, retention, production, and motivation. Attention refers to the process through which people selectively learn from mass media. Incorporated into the entertainment-education literature, the attention concept describes how people learn better from attractive characters and characters that they like (Smith, Downs & Witte, 2007). Next, retention refers to the process of constructing cognitive representations of information and behaviors into one’s own memory for ease of storage and retrieval, while production refers to the process of translating cognitive representations into concrete sequenced actions and skills that fit in individuals’ lifestyles. Finally, motivation distinguishes between acquisition and performance. In other words, the information people learn from the mass media may not translate into behavioral changes. Motivation mediates this path of the influence. Usually, people are motivated to change their behaviors if they perceive that the
behavioral change will lead to positive outcomes and if they feel that they can perform the behavior without facing external obstacles. Moyer-Gusé (2008) emphasized that entertainment media were advantageous in motivating audience members to perform suggested behaviors by presenting characters who are similar to the audience and who successfully implemented the behaviors and received benefits from them.

Wilkin and her colleagues (2007) conducted a study to examine the impact of viewing the telenovela Ladrón on individuals’ knowledge of breast cancer treatments, intentions to receive mammograms, and intentions to perform other information seeking and sharing behaviors. They found that regular Ladrón viewers demonstrated a significant increase in their knowledge of breast cancer treatments. Female viewers did not demonstrate a significant increase in their intentions to receive mammograms in the next six months due to the ceiling effect. However, male viewers demonstrated a significant increase in their intentions to tell someone else in their lives to receive mammograms. In addition, the study found that regular Ladrón viewers who identified with the characters of the telenovela program demonstrated a significant increase in their breast cancer knowledge. They also reported significantly more behaviors of sharing breast cancer treatment knowledge with other people and calling clinics and hotline numbers for information. In their study, Wilkin and her colleagues (2007) also examined the impact of viewing a PSA on seeking second opinions for breast cancer treatment. The character in the PSA was also the main character of Ladrón who was once incorrectly informed about breast cancer treatment by her doctor. The researchers found that the National Cancer Institute received significantly more telephone calls during the two hours after the PSA was broadcast, which was the recommended behavior of the PSA.

Many studies examining the effectiveness of entertainment-education programs were conducted for HIV/AIDS prevention or education encouraging protective sexual behaviors. Collins, Elliott, Berry, Kanouse, and Hunter (2002) found that adolescents who viewed the pregnancy
episode in *Friends* with adults reported significantly more discussion with adults about the episode. They also reported significantly greater belief in the efficacy of condoms. Further, the study also revealed that youths’ discussion about the episode with adults was positively related to their beliefs about condom efficacy. In conclusion, the study showed that exposure to *Friends* potentially increased adolescents’ knowledge about protective sexual behaviors. Kennedy, O’Leary, Beck, and Simpson (2004) also found effects of watching entertainment-education programs on information seeking. They discovered that after broadcasting several episodes of the soap opera *The Bold and the Beautiful* that contained HIV prevention messages, the number of calls to national STD and AIDS hotlines significantly increased. Smith, Downs, and Witte (2007) reported that exposure to a radio drama *Journey of Life* was positively related to people’s intentions to perform health behaviors to prevent HIV transmission among people in Ethiopia. This relationship was found to be mediated by emotional involvement, character identification, and perceived efficacy.

Emotional involvement or identification has been recognized by many scholars as the key to using drama to persuade people to perform health behaviors (Kincaid, 2002; Dal Cin et al., 2007; Slater & Rouner, 2002; Smith, Downs & Witte, 2007). One factor that critically influences emotional involvement or identification is perceived realism (Kincaid, 2002). By conducting focus groups, Guttman, Gesser-Edelsburg, and Israelashvili (2008) examined youth responses to an anti-drug abuse drama broadcast in Israel. They found that a large proportion of the audience members admitted that whether the drama was considered real influenced their emotional involvement with the messages. However, only a small percentage of the audience members reported identification with the drama characters due to low perceived risk of using drugs.

In conclusion, drama and fictional narratives are generally found to be effective in increasing audience knowledge (Collins et al., 2002; Wilkin et al., 2007) and encouraging audience members to discuss health issues further with other people or seek more information (Collins et al., 2002;
Kennedy et al., 2004). However, whether non-information seeking health behaviors could be significantly increased has been inconclusive. As social cognitive theory suggests, people do not always perform the behaviors that they learn (Bandura, 2002). According to Slater and Rouner (2002), behavioral changes not only depend on involvement with entertainment-education programs but also rely on individuals’ readiness to change. The studies reviewed above presented predictors of behavioral changes, including perceived risk (Guttman et al., 2008) and perceived efficacy (Smith et al., 2007). However, whether exposure to drama and fictional narratives could lead to behavioral changes was not conclusively found. How entertainment-education programs could address these issues in addition to increasing knowledge is warranted in future research.

Drama and fiction are ways to implement narrative. Good drama and fiction balance what audience members hope to happen and what they fear to happen (Kincaid, 2002). However, drama may be considered as high quality narratives with sophisticated plots and skillful craftsmanship, which are much more intense than stories told by ordinary people in daily life. The boundaries of narratives are broader than those of drama and fiction as narratives could be implemented in various formats, including news, advertisements, novels, and so forth (Green & Brock, 2000; Oatley, 2002; Strange & Leung, 1999). However, it is unknown whether stories told in daily life could be as influential as drama to change people’s health beliefs and behaviors.

**Narrative evidence and persuasion models.** Conventional persuasion research defines stories or narratives as a type of evidence rather than a unique genre of communication (Baseler & Burgoon, 1994; Kopfman, Smith, Yun & Hodges, 1998). Baseler and Burgoon (1994) defined stories as a type of evidence in comparison to statistical evidence. They argued that stories were small sample examples that the audience may feel easily identify. Although these stories were not randomly selected from a huge sample, audience members usually find the experiences portrayed in
the stories representative. This representative but non-quantitative nature of the narrative evidence has been emphasized by many scholars (Allen & Preiss, 1997; Baseler & Burgoon, 1994).

As scholars have argued, both narrative and statistical evidence could be influential but for different reasons. Statistical evidence is often considered as a strong argument in comparison to narrative evidence (Kopfman et al., 1998), as it is based on a large sample size. More favorable ratings were associated with statistical evidence if readers use sample size as an information-processing heuristic (Baesler & Burgoon, 1994, Greene and Brinn, 2003; Meng, 2009). Narrative evidence, on the other hand, is influential because it is vivid. Although narratives are not based on a large sample, people can easily feel that the stories they just read were representative of their experiences. This representativeness could serve as an information processing heuristic as well and might be able to overcome the effects of the large sample size heuristic (Baesler & Burgoon, 1994). Baseler and Burgoon (1994) argued that compared with statistical evidence, which is abstract, narrative evidence functions better to draw attention, provoke mental imagery, and facilitate information retrieval and storage in memory. Furthermore, the memory of favorable pieces of information often leads to better persuasive outcomes. Exemplification theory provides similar explanations for the superiority of concrete exemplars over statistical information to influence people’s judgments. Zillmann (2002) argued that concrete events are stored in memory better than abstract events. Following this logic, knowledge or memory should be used as an outcome variable to examine the effectiveness of narrative messages. However, the following literature review did not reveal much recent investigations in this area examining the narrative impact on knowledge or memory.

Several meta-analyses have been conducted to examine the overall persuasiveness of narrative evidence versus statistical evidence (Allen & Preiss, 1997; Reinhart & Feeley, 2007). Baesler and Burgoon (1994) found that thirteen out of nineteen studies they reviewed demonstrated
that narrative evidence was more persuasive than statistical evidence. Allen and Preiss (1997) found a marginal advantage of statistical evidence over narrative evidence in persuasion. Regardless of the results of the two studies, neither specified the outcome variables used to examine persuasion. In addition, the empirical studies examined by these two meta-analyses covered a large range of topics from adoption of new science programs to social issues, such as marriage and divorce. These findings were hardly applied to examine the persuasiveness of either type of evidence in changing health beliefs, attitudes, and behaviors. The meta-analysis conducted by Reinhart and Feeley (2007) partially solved these problems by classifying persuasive outcomes into different categories. In general, they found no significant advantage of either type of evidence when comparing their influence on message reactions and behavioral intentions. However, the meta-analysis revealed that health messages using narrative evidence were more influential in affecting people’s health attitudes than health messages using statistical evidence.

The effectiveness of narrative messages versus statistical messages has frequently been studied in persuasion related to organ donation. Kopfman et al. (1998) found narrative evidence functions better to induce emotional responses, such as anxiety. Statistical evidence, on the other hand, was more capable of generating significantly more pro-message thoughts about organ donation than narrative evidence. Feeley, Marshall, and Reinhart (2006) commented on the drawbacks of the within-subject design for evidence-type exposure in Kopfman et al.’s study (1998). Because participants in their study read a statistical message first and a narrative message second, a primacy effect might explain some of their findings. Feeley et al. (2006) replicated Kopfman et al.’s study by manipulating the order of the messages. Besides statistical and narrative messages, they added messages that combined statistical and narrative evidence into the comparison. Their results supported the hypothesis of a primacy effect that participants generated a greater number of total thoughts and positive thoughts to the first message that they read than to the second message.
regardless of the evidence type. However, they also found that participants rated both narrative messages and statistical messages more favorably than the combined messages. In conclusion, they did not find an advantage for either statistical evidence or narrative evidence in persuasion. Weber, Martin, Corrigan, and colleagues (2006) found that participants who read a narrative message refuting organ donation myths reported higher rates of signing organ donation cards than participants who read a statistical message. However, the results were less useful for scholars to make a judgment on the persuasiveness of either type of message since the statistical and narrative messages were written using different perspectives. The statistical message used in the study focused on the importance of organ donation, while the narrative message focused on challenging people’s erroneous beliefs about organ donation. In summary, the empirical findings suggested mixed support for the advantages of narrative evidence in persuasion related to organ donation. Similar patterns were found in persuasion related to other health topics.

Greene and Brinn (2003) found that both statistical and narrative evidence can increase people’s perceived susceptibility to skin cancer and decrease people’s intentions to use tanning beds. Overall, they found that statistical evidence was slightly more persuasive than narrative evidence, but they argued that statistical and narrative evidence functioned differently. Participants generally rated statistical evidence to be more informational but evaluated narrative evidence to be more real. Some recent studies examined the impact of narrative messages by extending the comparison to narrative and informative messages. Barriga, Shapiro, and Porticella (2009) examined message evaluations and intentions to perform recommended behaviors concerning food safety after reading narrative and informative messages. They operationalized narrative messages as first-person accounts and informative messages as straightforward risk information with no identifiable characters. However, both types of messages could contain statistical evidence or not. Overall, they found that informative messages were significantly more favorably rated. Participants who read informative messages
reported greater likelihood to perform specific behaviors, such as using separate and clean utensils for raw food versus other food and using food thermometers during cooking, than participants who read narrative messages.

Empirical evidence has also suggested that narrative evidence is more influential in reducing counter-arguments than the statistical evidence. Slater and Rouner (1996) found that anecdotal evidence is particularly effective when recipients’ previous values or beliefs were incongruent with the values of the messages that they read. They found that alcohol education messages with statistical evidence were evaluated to be more persuasive when there was a value-congruency between the message and the recipients. However, messages with anecdotal evidence were rated to be more persuasive when there was a value-discrepancy. In a study investigating the persuasion effects of different types of evidence on binge drinking and smoking, Meng (2009) found participants spent significantly more time reading statistical messages but demonstrated significantly more elaboration after reading narrative messages. More interestingly, the study revealed that the amount of elaboration after reading statistical messages relied on prior experience, while the amount of elaboration after reading narrative messages was independent from participants’ involvement with the health issue. Both studies suggested that prior attitudes did not influence message processing when participants were invited to read narrative messages (Meng, 2009; Slater & Rouner, 1996). Therefore, narrative persuasion could be potentially effective to reduce counter-arguments. In fact, the second study also indicated that narrative involvement does not rely on the topic of the message (Meng, 2009).

In conclusion, the empirical findings suggest that narrative messages have potential to provoke emotional responses (Dunlop, Wakefield, & Kashima, 2008; Kopfman et al., 1998) and reduce counter-arguments (Slater & Rouner, 1996; Meng, 2009) that facilitate information processing and persuasion. However, whether narrative messages are more effective than statistical
messages in persuading people to perform health behaviors is not conclusive based on previous research. First of all, some scholars have argued that narrative information is easier to be memorized and retrieved from memories. However, most studies included in the above literature review did not test this particular hypothesis. In addition, most previous research in this area viewed narratives as a type of evidence rather than a unique genre of communication. Therefore, the strength of messages was first estimated (i.e., narrative evidence were considered to be weak arguments compared with statistical evidence) (Kopfman et al., 1998). Then, particular information processing mode and consequential amount of cognition were hypothesized and examined. As stated before, research in this area considered cognitive elaboration as the key mechanism that causes attitudinal and behavioral changes. However, many scholars have argued that cognitive elaboration was not an explanatory mechanism of narrative persuasion (Green & Brock, 2002; Meng, 2009; Slater & Rouner, 2002).

Defining narratives as a type of evidence rather than a unique communication genre narrows the boundary of the concept. The processes people experience when reading narratives versus non-narratives might be completely different. When people read a story, they might temporarily lose access to the real world in which they live, thereby limiting their access to the cognitive resources that they may use to counter-argue. Even though there may be a lack of elaboration when reading a story, such as scrutinizing the content of the narrative message and fact checking using life experiences, the audience may still follow the characters’ paths in the story and change their own attitudes and behaviors. Therefore, cognitive elaboration cannot or cannot exclusively explain the attitudinal and behavioral changes after narrative exposure. Scholars have thus called for other theories to explain the process of narrative persuasion (Green & Brock, 2002; Slater & Rouner, 2002).
Personal testimonials. Regardless of the fact that conventional persuasion research considers narrative stories as a type of evidence, this stream of research studies narrative effects of personal testimonial versus research in entertainment education which studies narrative effects of drama. As different forms of narratives, personal testimonial and drama may function differently. De Wit, Das and Vet (2008) defined a personal testimonial as “a first-person account of someone who came to experience a particular condition” (p. 110). The authors of these first-person accounts of experiences may be not as skillful as writers of fictions and dramas when presenting the stories. Therefore, whether these accounts of personal experiences could be as emotionally arousal as drama and result in persuasion effects that drama could lead to are unknown. However, personal testimonials are often rated high in scales of perceived realism (Baseler & Burgoon, 1994; Greene & Brinn, 2003) and thus influence audience members as exemplars of real world experiences.

The personal stories people could encounter in online health support groups are undoubtedly personal testimonials. The current study would examine how this particular type of narratives is processed by audience members and lead to changes in their health attitudes and behavioral intentions. No specific theory of narrative persuasion has been developed to exclusively explain persuasion effects of this particular type of narratives. Therefore, hypotheses about effects of personal testimonials are proposed by following narrative persuasion literature in general. Unique findings concerning this particular type of narratives will be discussed later.

Narrative processing

Many scholars have argued that narrative processing is different from processing other persuasive messages (Green & Brock, 2002; Slater & Rouner, 2002). High quality narratives could facilitate audience immersion into the narrative world, which is considered the key to narrative persuasion (Green, 2002; Kincaid, 2002; Slater & Rouner, 2002). Persuasion happens when audience members identify with narrative characters, show sympathy towards the characters’ experiences, and
try to imitate the characters that they like. Green and Brock (2002) argued that when transported into
the narrative world, people generate mental imagery of the characters’ experiences. Meanwhile, they
temporarily lose access to the reality in which they live. The greater the mental image the audience
can generate, the greater the change in beliefs they would possibly experience. Green and Brock
(2002) named this process transportation. Gerrig (1993) defined transportation as a journey:
“Someone ("the traveler") is transported, by some means of transportation, as a result of performing
certain actions. The traveler goes some distance from his or her world of origin, which makes some
aspects of the world of origin inaccessible. The traveler returns to the world of origin, somewhat
changed by the journey” (Gerrig, 1993, pp. 10-11). Green and Brock (2002) emphasized the loss of
access to the world of origin as an essential process of transportation as well. Loss of access happens
at both physical and psychological levels. A person immersed in a narrative world may not notice
what happens in the room and may not be thinking about reality and the associated facts. Because of
this loss of access, transportation is presumably negatively related to the number of counter-
arguments that people can generate. Slater and Rouner (2002) argued that false noticing and
transportation were incompatible. When people are transported into the narrative world and
temporarily lose access to the real world, they do not think about their life experiences in the real
world. As a consequence, their cognitive resources are not used to check whether details depicted in
the narrative messages are consistent with events that happen in reality. In one study, Green and
Brock (2000) instructed participants to circle “false notes” after reading a narrative. They found that
participants who received this instruction were transported significantly less into the narrative world
compared with participants who did not receive this instruction and were encouraged to transport
themselves into the story while reading the narrative. As reviewed before, empirical evidence
suggests that narrative messages are considered to be more persuasive than non-narrative messages
to audience members who hold different prior attitudes from the messages. In addition, compared to
non-narrative messages, which facilitate elaboration when readers were previously involved in the topic of the message, elaboration to narrative messages is not inhibited by prior attitudes and life experiences (Meng, 2009; Slater & Rouner, 1996). In other words, when the narrative transports the audience into the narrative world, audience members are less likely to counter-argue against the narrative message that they receive. Therefore, the following hypothesis is proposed:

\( H_1: \) Participants in narrative conditions will generate fewer counter-arguments than participants in non-narrative conditions.

Narrative involvement is an emotion-dense experience. Oatley (2002) said “emotion is to fiction as truth is to science” (p. 39). People often tear after reading a novel or watching a drama. Slater and Rouner (2002) defined narrative absorption as “vicariously experiencing the characters’ emotions and personality” (p. 178). De Gaaf, Hoeken, Sanders and Beentjes (2009) found emotion taking has been measured by many scales for narrative involvement. Oatley (2002) claimed that the emotional immersion experience helps audiences relive their own experiences. Drama theory emphasizes that experiencing the emotional fluctuations of the characters is the key of narrative persuasion that could result in attitudinal and behavioral changes among audience members (Kincaid, 2002). By experiencing the happiness and misfortunes of the characters, audiences experience the confrontations that the characters experience in a drama. With following the path of the characters, it is more likely for the audience members to change their own attitudes and behaviors. As a result, the entertainment-education programs achieve their education and persuasion objectives.

Empirical evidence has suggested that narrative messages functioned better to elicit emotional responses than non-narrative messages. In a study examining intentions of signing organ donation cards, researchers have found that narrative messages more easily elicited anxiety (Kopfman et al., 1998). Dunlop, Wakerfield, and Kashima (2008) developed a new typology to study
emotions that are elicited by public health messages. They classified emotional responses to three categories including message-referent emotions, plot-referent emotions and self-referent emotions. According to their definitions, message-referent emotions refer to the emotions generated towards the content of the message, such as the visual and/or auditory content, or the source of the health message. For example, disgust evoked after watching a picture of the lung of a heavy smoker is considered to be a message-referent emotion. Plot-referent emotions refer to the “emotions experienced in relation to a character or to a situation” (Dunlop et al., 2008, p. 54). Sympathy after knowing someone’s misfortune could be considered as a plot-referent emotion. Self-referent emotions refer to the emotions resulted from stimulating self into the message. Anxiety found in the study conducted by Kopfman and his colleagues (1998), for example, could be considered a self-referent emotion, which was generated by the participants from imaging possibility of finding oneself in the negative situation. However, as Dunlop and her colleagues argued, discrete emotions could play different roles across these categories. In other words, the same emotion could be either a plot-referent emotion or a self-referent emotion depending on different situations.

Sympathy has been a widely studied emotion in the context of narrative persuasion (Smith, 1998). Feeling sympathy or empathy to others was considered a natural component of narrative engagement (Dal Cin, Zanna & Fong, 2004; Escalas & Stern, 2003; Slater, 2002). However, sympathy should be distinguished from empathy (Escalas & Stern, 2003; Keen, 2006). Escalas and Stern (2003) argued that people who experience sympathy are still aware of their personal lives while people who experience empathy are unself-conscious. Rather than viewing empathy as an emotional state, Davis (1983) defined empathy as the individual trait that could facilitate identification. The concept of empathy contains four aspects, including whether people are likely to take others’ perspectives, whether people are easily transported into a fantasy world, whether people have empathic concerns, and whether people feel comfortable to respond to others’ emotions. In
summary, it is not unusual to view empathy as a component of identification or other narrative engagement process (Dunlop et al., 2008; Escalas & Stern, 2003; Keen, 2006). Sympathy, however, is the emotional response that people experience as a result of being empathic (Escalas & Stern, 2003; Keen, 2006).

Following the typology developed by Dunlop and colleagues (2008), sympathy could be both a plot-referent emotion, after witnessing someone’s misfortune, and a self-referent emotion, as a result of imaging oneself in the negative situation. Dunlop and her colleagues (2008) emphasized the importance of studying self-referent emotions because self-referent emotions are more directly related to changes in assessments of health risks, attitudes and behaviors. Supporting this claim, Escalas and Stern (2003) found that exposure to advertising dramas could elicit sympathy among participants, which was positively related to pro-message attitudes. Therefore, the following hypothesis is proposed:

\[ H_2: \] Participants in narrative conditions will produce greater emotional responses (i.e., sympathy) than participants in non-narrative conditions.

Studies have also found narrative exposure could increase interpersonal discussion (Collins et al., 2002; Kennedy et al., 2004). As narrative messages often present conflicts and mysterious plots to the audience members and invite them to experience intense emotions (Kincaid, 2002), narrative exposure naturally encourages interpersonal discussion. Conventional media research argued that the mass media are capable of setting agendas and building frames for interpersonal discussion (McCombs & Shaw, 1972; Cho, 2005). Recently, research has also found the superiority of narrative messages in eliciting emotions could also increase interpersonal discussion at the same time. Dunlop and her colleagues (2008) argued that emotional-elicit experiences encouraged social sharing.
Studies of public health campaigns have found that not only the frequency of interpersonal discussion increases after narrative exposure. More importantly, mediated by interpersonal discussion, narrative exposure leads to a greater amount of correct health beliefs and greater intentions to perform health behaviors (Collins et al., 2002; Dunlop et al., 2008). In their model of entertainment-education, Slater and Rouner (2002) hypothesized that transportation into the narrative world would facilitate interpersonal discussion. The interpersonal discussion has a rehearsal or reinforcement effect. The rehearsal process defined by Slater and Rouner (2002) was similar with the retention process defined by Bandura (2002) in social cognitive theory. Through interpersonal discussion, people re-frame what they witnessed from the narratives and integrate the new information into memory. New information is repackaged and stored in memory for easier retrievals in the future. Slater and Rouner (2002) argued that interpersonal discussion mediates the relationship between narrative involvement and attitudinal and behavioral changes. In summary, narrative exposure leads to more interpersonal discussion. In the context of online health support groups, interpersonal discussion is represented as greater willingness of writing a response or writing a longer response to share information to the existing communication interactions. Therefore, the following hypothesis is proposed:

\[ H_3: \text{Participants in narrative conditions will demonstrate greater willingness of online health support group participation, represented by a) a greater ratio of participants in narrative conditions would write a response, or b) would write a longer response to share personal information, than participants in non-narrative conditions.} \]

In summary, scholars have increasingly agreed transportation as the unique explanatory mechanism of narrative persuasion. Other terminologies have been used to describe this process, such as identification, absorption, engagement and immersion (Gerrig, 1993; Green & Brock, 2002; Moyer-Gusé, 2008; Slater & Rouner, 2002; Sood, 2002). Green and Brock (2000) defined
transportation as “a convergent process, where all mental systems and capacities become focused on events occurring in the narrative” (p. 701). As argued before, the convergent experience makes people lose access to the world that they live temporarily and therefore reduces the chances of counterarguing. In addition, the convergent experience makes the audience experience the intense emotions experienced by the characters. After the journey to the narrative world, the audience will come back to the original world with some changes (Gerrig, 1993). These changes could occur because the audience members witness the attractive characters being punished for misbehaviors and the audience members feel the pains of these characters with whom they identify. By observing that, the audiences feel the need to perform recommended behaviors.

Slater and Rouner (2002) proposed an extended elaboration likelihood model to understand narrative persuasion. They argued that the conventional elaboration likelihood model was not applicable to explain narrative persuasion as. The conventional ELM studies responses to explicitly persuasive messages where involvement with the topic of the message and cognitive elaboration are key underlying mechanisms. Slater and Rouner (2002) differentiated issue involvement (i.e., involvement with the topic of the persuasive message) and narrative involvement. They argued that people tend to demonstrate cognitive elaborations when they feel motivated such as when the persuasive messages discuss some issues that the audience members were or are currently involved. This motivation stems from seeing personal relevance to the issue addressed by the persuasive messages. When motivated, people tend to systematically scrutinize the persuasive messages, be active to elaborate, and as a result, demonstrate lasting attitudinal changes. For narrative persuasion, on the other hand, involvement is not mainly influenced by personal relevance. Rather, the craftsmanship of the narrative (Green & Brock, 2002; Slater & Rouner, 2002) and individual differences such as empathy and transportability (Bilandzic & Busselle, 2008; Dal Cin, Zanna & Fong, 2004; Davis, 1983) are more influential to determine the degree of narrative involvement.
Thus, the scholars improve the conventional model and develop an extended elaboration likelihood model. In the extended elaboration likelihood model, Slater and Rouner (2002) proposed that narrative involvement mediates the relationship between narrative exposure and persuasion. This relationship has also been proposed by many other scholars (Green & Brock, 2002; Kincaid, 2002; Smith et al., 2007). As reviewed before, Slater and Rouner (2002) argued that narrative engagement includes narrative absorption and character identification. In addition, narrative absorption predicts character identification. As the audience members become transported into the narrative world, they could generate connections with the narrative characters. The audience members would feel what the characters felt and become a part of the imagined world. Cohen (2001) defined character identification as “a process that consists of increasing loss of self-awareness and its temporary replacement with heightened emotional and cognitive connection with a character” (p. 251). As a result of engaging in the narrative world, attitudinal and behavioral changes would be resulted because the audience members would feel themselves as a part of the action. That’s how the suggested changes on media characters designed in the entertainment education messages could influence the audience as well. Therefore, the following hypothesis is proposed:

\( H_4: \) Narrative engagement (including identification and transportation) mediates a) the negative relationship between narrative exposure and counter-arguing, b) the positive relationship between narrative exposure and emotional responses, c) the positive relationship between narrative exposure and willingness of online health support group participation, d) the positive relationship between narrative exposure and attitudes, and e) the positive relationship between narrative exposure and behavioral intentions.

Social Support

Social support is found to be positively related to a variety of health outcomes such as normality of blood pressure and cardiovascular reactivity, reduction of stress, and protection of
coronary heart disease (Wilson, Kliwer, Bayer, Jones, Welleford, Heiney, & Sica, 1999; Wright, 2002; Wright & Bell, 2003). The benefits of social support are not only applied to face-to-face communication, but also to communication that takes place in a virtual space. A great amount of research has suggested that using online support groups could effectively reduce stress among patients with chronic diseases and people facing aging (Preece, 1999; Weinberg, Uken, Schmale & Adamek, 1995; Wright, 2000a, 2002). Reduced stress is related to a strengthened immune system, normal blood pressure and many positive physical health outcomes (Wright & Bell, 2003). Besides physical health benefits, engagement in online support groups can also be positively related to individuals’ mental health, possibly curing depression (Houston, Cooper & Ford, 2002).

Several hypotheses were proposed to explain the relationship between social support and psychological and physical well-being (Burelson & MacGeorge, 2002; Cohen & Wills, 1985). The buffering hypothesis assumes that after a stressful event, social support could prevent stress appraisal or reduce negative emotional responses associated with the stressful event. Social support may reduce the perceived importance of a stressful event and, through tranquilizing the neuroendocrine system, make people less responsive to stress (Cohen & Wills, 1985). The main effect model of social support, on the other hand, explains what direct effects social support has instead of investigating the mediating roles of social support in stress coping. The milestone study conducted by Berkman and Syme (1979) found people who had more community ties had lower mortality nine years later. Derived from a sociological view, the main effect model of social support focuses on benefits from having social contacts and community ties. Available support from a larger social network is believed to help people avoid negative experiences such as economic problems, evoke positive emotional experiences and promote positive psychological states such as optimism. In addition, social support has been believed to help people recognize self-worth and bring rewarding experiences of social integration to them (Burelson & MacGeorge, 2002; Cohen & Wills, 1985).
Cobb (1976) defined social support as information “leading the subject to believe that he is cared for and loved… esteemed and valued… [and] belongs to a network of communication and mutual obligation” (p. 300). Burleson (2009) defined support interactions as “communicative episodes organized around the effort by a helper to provide assistance through messages to a recipient perceived as in need of aid” (p. 23). When support is evaluated for effectiveness, several dependent variables have been examined. Received support - which refers to specific support provided by parents, a spouse, children or siblings and represented by the number of times a support recipient was listened, cheered, comforted, counseled and so forth - has often been self-reported in academic studies (Wethington & Kessler, 1986; Wills & Shinar, 2000). Perceived support, on the other hand, emphasizes perceptions of available support when needed (Burelson & MacGeorge, 2002; Cohen & Wills, 1985). Competing theories hypothesized different predictors of perceived support. Originally, scholars believed past experiences of receiving support influenced perceived support availability. Later, some scholars believed that perceived support availability may stem from stable personality traits as some people may constantly think they are loved while some people may not (Lakey & Cassady, 1990). Perceived support was found strongly correlated with many psychological and physical well-being outcomes (Cunningham & Barbee, 2000; Larkey & Cassady, 1990). This linear relationship, however, was not conclusively found between received support and well-being (Antonucci & Israel, 1986; Larkey & Cassady, 1990).

Following Berlo’s (1960) “model of communication”, Burleson (2009) identified individual impact of message content, support provider, support receiver and interaction context on perceived support. Message content referred to the features of the supportive message. Supportive messages were defined as “specific lines of communicative behavior enacted by one party with the intent of benefiting or helping another” (Burelson & MacGeorge, 2002, p. 386). Scholars have distinguished different types of support because of their unique functions (Cohen, Mermelstein, Karmarck, &
For example, emotional support refers to the provision of emotional care, encouragement, sympathy and such that make the support receivers feel respected and admired, while instrumental support, which includes informational support and material support, refers to the provision of information, advice, goods and service to meet individual needs (Jacobson, 1986). Research suggested that supportive messages for different functions vary in message content and can be exclusively coded (Coulson, Buchanan, & Aubeeluck, 2007). In addition, Burleson and MacGeorge (2002) argued that different degrees of embracing person-centered messages may lead to people’s favorability to emotional supportive messages over other types of messages.

Features of the support provider may also influence support outcomes (Burleson, 2009). For example, studies suggest that the gender of the support provider (Glynn, Christenfeld & Gerin, 1999; Kunkel & Burleson, 1999; Uno, Uchino & Smith, 2002), attractiveness of the support provider, and credibility of the support provider (Feng & MacGeorge, 2006) may all influence support effectiveness. Perceived relationship between the support provider and the recipient also influences support outcomes. Studies showed that supportive messages were considered more helpful if recipients thought the helper is close to them (Feng & MacGeorge, 2006; Uno et al., 2002) or has similarity with them (Weinberg, Uken, Schmale & Adamek, 1995; Wright, 2000b, 2002).

Features of recipients such as attachment styles, cognitive complexity and cognitive processing styles might also influence perceived support (Lee & Feng, 2008; Lemieux & Tighe, 2004). For example, previous research has found people with secure attachment style, referring to people who are comfortable with being close to others, were more likely to prefer high-level comforting messages, than people with anxious/ambivalent and avoidant attachment styles, referring to people who are less comfortable with being close to others and often avoid providing or receiving caregiving (Lemieux & Tighe, 2004).
Support interactions are also sensitive to contextual factors. In an investigation of the effectiveness of comforting strategies, Lemieux and Tighe (2004) found supportive messages at moderate level of person centeredness was most favored by recipients. This finding challenged the linear relationship that scholars have found for decades between person centeredness of supportive messages and support effectiveness (Burleson, Samter, Jones, Kunkel, Holmstrom, Mortenson & MacGeoge, 2005). Burleson and his colleagues (2005) examined the former study and proposed that the unique finding might be due to the interaction setting. In Lemieux and Tighe’s study, participants were asked to imagine a hypothetical scenario in which they suffered from a stressful event and ran into one friend when walking across campus. Participants were asked to evaluate the quality of the supportive messages hypothetically given by the friend. Burleson and his colleagues (2005) argued that because people were asked to imagine that they encountered social support in a public setting, they might prefer the support that did not require them to fully disclose their own feelings. Therefore, moderate person-centered messages were preferred in this scenario. The arguments from Burleson and his colleagues (2005) indicate that support interactions and outcomes are sensitive to the setting of support interactions. Contextual factors that might influence support outcomes may also include medium of supportive interactions (i.e., face to face or computer-mediated), appraisal of problems (i.e., severity of the problem, responsibility of the problem), and the like (Houston, Cooper & Ford, 2002; Wright & Bell, 2003).

The current study aims for examining message differences for different support types and consequential impacts. In a content analysis of bulletin board messages in a community for people suffering from knee injuries, Preece (1999) found 44.8% of 500 analyzed messages were empathic, 32.0% were personal stories, and 17.4% contained factual information. Preece and Ghozati (2001) re-tested the findings of the content analysis conducted by Preece (1999) by enlarging the sample to 2000 messages from 100 online communities. The results showed that 81% of the communities
contained empathic messages. Among them, medical support communities were the top category where empathic messages are widely spread. Emotional versus information support will be focused on in the following literature review. As this study addresses the function of online health support groups, specifics of the environment and the influence on supportive communication will be discussed.

**Emotional and informational support**

Barbee and colleagues (1990) developed a typology to study supportive behaviors. They found coping behaviors can be classified using two dimensions: a dimension from problem-focused to emotion-focused and a dimension from approaching to avoiding problems and emotions. According to Barbee’s typology, emotional support behaviors refer to approaching coping behaviors that are emotion-focused such as giving a hug. Informational support behaviors refer to approaching coping behaviors that are problem-solving focused such as giving suggestions.

A common definition of emotional support is “expressions of care, concern, love, and interest, especially during times of stress or upset” (Burleson, 2003, p. 2). As the emotional support provider usually helps the upset other by listening, empathizing and actively exploring deepest feelings, many scholars argued that emotional support is crucial to close relationships (Burleson, 2003). The importance of emotional support has been verified in a great amount of research (Darkof & Taylor, 1990; Krishnasamy, 1996). Darkof and Taylor (1990) interviewed 55 cancer patients ranging from 30 to 70 years old to evaluate helpful and unhelpful supportive actions provided by a spouse, other family members, friends, and so forth. They found emotional support behaviors including expressing concern, empathy, or affection were considered the most helpful behaviors. Among patients hospitalized because of a haematological malignancy, nurses’ emotional support behaviors such as getting to know the patients or the behaviors reflecting interpersonal intimacy were most frequently identified as helpful behaviors, followed by information support behaviors
In an investigation of group dynamics in cyberspace, Weinberg, Uken, Schmale and Adamek (1995) found that group interactions with the purpose of emotional regulation including installation of hope, group cohesion, catharsis and altruism were all positively related to users’ perceptions of support.

Many studies have suggested the positive influence of emotional support on physical health (Berkman, Leo-Summers, & Horwitz, 1992; Krumholz, Butler, Miller, Vaccarino, Williams, de Leon, Seeman, Kasl, & Berkman, 1998; Shaw, Krause, Chatters, Connell, & Ingersoll-Dayton, 2004; Slevin, Nichols, Downer, Wilson, Lister, Arnott, Maher, Souham, Tobias, Goldstone, & Cody, 1996). Shaw and colleagues (2004) found that people who were lack of emotional support from parents in childhood were significantly more likely to demonstrate depressive symptoms and chronic health problems in adulthood. Conversely, people who received sufficient support demonstrated better mental health. A study conducted by Slevin and colleagues (1996) on health of cancer patients revealed that the patients who were satisfied with emotional support that they received were significantly less anxious and depressed. Krumholz and colleagues (1998) found that the lack of emotional support significantly predicted occurrence of fatal and nonfatal cardiovascular events among elderly women with clinical heart failure. In a survey targeting elderly people who were hospitalized for acute myocardial infarction, Berkman, Leo-Summers, and Horwitz (1992) noted that emotional support predicted the survival after myocardial infarction after controlling for the impacts of illness severity, comorbidity, smoking, hypertension and other risk factors.

Informational support, on the other hand, refers to “expressions that provide facts, advice, and appraisals regarding situations of concern” (Xu & Burleson, 2001). Different from emotional support, empirical evidence suggested that people sometimes demonstrated resistance to information support (Feng & MacGeorge, 2006; Feng & Burleson, 2008; Lee & Feng, 2008). Lee and Feng (2008) conducted an experiment to examine support effectiveness in an imaginary scenario. They
found how likely people like to use rational thinking style significantly influenced subjective evaluations of informational supportive messages. However, people generally demonstrated favorability to emotional supportive messages regardless of their thinking styles. Feng and Burleson (2008) examined effective strategies that could be used in advice giving. They found advice that was given with articulation of efficacy was rated significantly more supportive and favorable. Articulation of efficacy was also associated with greater intentions of advice compliance among participants. Inclusion of facework (i.e., acknowledging other’s feelings) in advice provision was considered effective as well. Advice messages that used facework were considered more facilitative of coping than advice messages that did not use facework. Feng (2009) found that supportive interactions that provided advice after emotional comforting were considered higher in quality than supportive interactions that presented advice only. She also argued that different supportive behaviors were not mutually exclusive. Providing emotional support does not mean no advice would be provided during supportive interactions. Similarly, efforts could be offered to reduce emotional distress when supportive interactions are aimed for advice provision. Therefore, effective communication strategies that contain multiple types of support should be explored.

**Features of effective comforting messages**

A great amount of empirical findings have suggested that high person-centered messages are the most sensitive and effective way of support provision. Person centeredness indicates whether supportive messages “explicitly acknowledge, elaborate, legitimize, and contextualize other’s feelings and perspective” in supportive contexts (Burleson, Samter, Jones, Kunkel, Holmstrom, Mortenson, & MacGeorge, 2005, p. 88). Operationally, supportive messages at low levels of person centeredness deny or criticize other’s feelings. Supportive messages at moderate levels of person centeredness recognize other’s feelings and show sympathy. But these messages aim to distract people’s attentions from the suffering experience as a way to solve the problem. Usually, these
messages provide non-feeling related explanations to help recipients to cope with the situation. Supportive messages at high levels of person centeredness not only recognize other’s feelings or show sympathy to the other, but also try to help people elaborate on their feelings and figure out the origins of the feelings. Strategies to deal with these feelings are developed to cope with the stressful event (Burleson, 1992; Burleson, 1994; Burleson, 2003; Burleson, 2009; Burleson & Mortenson, 2003; Burleson et al., 2005). Jones and Gerrero (2001) presented three examples of supportive messages at different levels of person centeredness to a person who lost a scholarship competition:

Low person-centered message: “It’s not the end of the world that you did not get the scholarship. It’s not like you had to get it in order to stay in school. So, don’t make such a big thing out of it.”

Moderate person-centered message: “Well, you’ve still got a 3.3 GPA and that’s pretty impressive. I’ll tell you what–let’s go to Harry’s and have a few drinks. Things ought to be pretty lively there today.”

High person-centered message: “I know you’re pretty down about the scholarship. It’s really hard to accept something like this when you’ve been looking forward to getting it for such a long time. Remember though, you were one of the finalists and that’s a big accomplishment” (Jones & Gerrero, 2001, p. 569).

The difference in person-centeredness of these supportive messages can be well seen from these examples. Numerous studies have found that high person-centered messages were viewed more helpful and effective in supportive communication (Burleson & Mortenson, 2003; Cappella & Klein, 2006; Kunkel & Burleson, 1999; Jones, 2004; Jones & Gerrero, 2001).

For decades, support research has found that the gender of the support provider and the support recipient influences support outcomes (Glynn, Christenfeld & Gerin, 1999; Uno, Uchino & Smith, 2002; Woodward, Rosenfeld & May, 1996). Different theories were developed to explain this
phenomenon. Some suggested that males and females live in different emotional cultures which result in difference in support provision and processing (Wood & Inman, 1993; Woodward, Rosenfeld & May, 1996). Some suggested that men and women vary in skills of providing support (Kunkel & Burleson, 1998). However, this claim was not empirically supported concerning the favorability towards supportive messages that vary at levels of person centeredness. For example, Kunkel and Burleson (1999) found both men and women rated high person-centered messages more sensitive and effective, which refuted the different culture account in explaining gender difference in supportive communication. In addition, favorability towards high person-centered messages was not only supported in western cultures but also in non-western cultures (Burleson & Mortenson, 2003). Burleson and Mortenson (2003) found that, despite cultural difference, both American and Chinese participants rated high person-centered supportive messages more favorable than low person-centered messages. However, American participants were more sensitive to the change in the level of person centeredness in provided support than Chinese participants.

Investigations in person-centered messages and their effectiveness have been conducted in many health contexts. Using person-centeredness hierarchy developed by Applegate (1980) and Burleson (1982), Cappella and Klein (2006) examined messages appearing in online health support groups about breast cancer and perceptions towards these messages among women older than 40 years old. Results of the study revealed that, even though the effect size (i.e., R square change) was small, the level of person centeredness significantly predicted message perceptions: high person-centered messages were rated more effective. This pattern was similarly found among women diagnosed with breast cancer and women who were not.

Many studies have made efforts to explain the effectiveness of high person-centered supportive messages. Some scholars argued that dismiss and escape behaviors, which are the solutions derived from low person-centered messages, were ineffective in supportive contexts
(Burleson & Mortenson, 2003; Cunningham & Barbee, 2000). Jones (2004) found the use of high person-centered supportive messages exclusively explained positive emotional change among support recipients. She also found participants who received high person-centered supportive messages believed that the helper was more supportive and caring, mediated by these positive emotional changes. Burleson (2009) even argued that the favorability towards emotional support over information support might be caused by an emphasis on sensitively using high person-centered messages in the provision of emotional support. In this study, supportive messages in emotional support conditions were characterized with high person-centeredness, whereas supportive messages in non-emotional support conditions were characterized with low person-centeredness. Participants in non-support conditions did not receive any supportive message. Therefore, the following hypothesis is proposed:

\[ H_5: \text{Participant in emotional support conditions would rate the online health support group most supportive, followed by participants in non-emotional support conditions and participants in non-support conditions.} \]

**Online health support**

Early work on supportive communication was often conducted in conventional communication settings, such as face to face conversations (Jones & Guerrero, 2001; Jones, 2004). Unique communication perspectives, such as nonverbal immediacy, were examined in these interaction settings. Nonverbal immediacy refers to eye gaze, smiling, and body language that indicate interpersonal warmth. This concept could be fully applied in face to face communication rather than in online communication. In recent years, scholars have increasingly examined the use of online health support groups and its outcomes (Davison, Pennebaker & Dickerson, 2000; Houston, Cooper & Ford, 2002; Rains & Young, 2009; Shaw, Hawkins, McTavish, Pingree & Gustafson,
Unique communication perspectives concerning online communication should be further examined.

Many scholars have examined the predictors of online health support group use. Davison, Pennebaker and Dickerson (2000) found that people with stigmatized illness, such as AIDS, alcoholism, breast and prostate cancer, are more likely to favor online support groups than people with diseases that are normally equally devastating across social categories. The same pattern was testified by Berger, Wagner and Baker (2005). In a national survey, Berger, Wagner and Baker (2005) found people with stigmatized illnesses including anxiety, depression, herpes, and urinary incontinence reported more frequent use of the Internet in general for health information than people with non-stigmatized chronic diseases such as cancer, heart problems, diabetes and back pain. People with stigmatized illnesses also reported more frequent use of the Internet for communicating with clinicians.

To explain this phenomenon, reasons of favorability of using online health support groups among people with stigmatized illnesses were surveyed. Wright (2000b) recruited participants from 30 online support groups across six different categories, including support groups for abuse recovery, eating disorder, terminal illnesses, social anxiety, and mental illness, and asked them to evaluate advantages and disadvantages of online support over face to face support. The study revealed that anonymity of online support was the most frequently identified advantage. Participants argued that anonymity of the medium lead to less perceived stigmatization from other users of the online support group. These studies suggested that Internet support groups provided people with stigmatized illnesses, who were previously afraid of social isolations and consequentially avoided seeking health information and help, a perceived safer channel to seek information and help (Wright & Bell, 2003; Berger, Wagner, & Baker, 2005; Buchanan, Joinson, Paine, & Reips, 2007).
Reducing stigmatization and making people feel more respected and less isolated could be considered as one outcome of emotional support and a main function of online support groups (Coulson, Buchanan, & Aubeeluck, 2007; Preece, 1999; Preece & Ghozati, 2001; Weinberg, Uken, Schmale & Admek, 1995; Wright, 2000a). Content analyses conducted by Preece and colleague revealed that communication in online health support groups was predominated by emotional supportive messages (Preece, 1999; Preece & Ghozati, 2001). Similarly, in an analysis of messages of an online health support group about Huntington’s Diseases, Coulson and colleagues found messages coded in informational support and emotional support categories dominated the group communication (Coulson, Buchanan & Aubeeluck, 2007).

Many scholars believe that the Internet is inherently effective for supportive communication. Besides anonymity, similarity was another most frequently identified reason to favor online health support group use (Weinberg, Uken, Schmale & Admek, 1995; Wright, 2000b, 2002). Campell and Wright (2000) asked members of online support groups for substance abuse, cancer, HIV/AIDS, Alzheimer’s disease, eating disorders, depression and divorce support to evaluate characteristics of online support groups and perceived emotional support. They found perceived emotional support was positively related to perceptions of similarity, immediacy, receptivity and equality, and was negatively related to perceptions of dominance and formality of communication. Weinberg, Uken, Schmale and Adamek (1995) examined the relationship between features of computer-mediated support groups and perceived helpfulness among women diagnosed with breast cancer. They found all features of support group interactions that were related to emotional regulation including installation of hope, group cohesion, catharsis and altruism were positively related to users’ perceived support.

As a result of receiving emotional support through online health support groups, Wright (2002) found cancer patients reported less perceived stress. Similarly, elderly people also reported
less stress if actively engaged in online health support groups (Wright, 2000a). Moreover, Houston, Cooper and Ford (2002) found that depression patients who were heavy Internet support group users after using the groups for a long period showed higher likelihood to find depression resolutions than light online support group users.

Despite the advantages of using the Internet for health support, specific concerns regarding the medium may inhibit supportive interactions. Disadvantages of Internet support groups identified in previous literature include inability to engage in haptic communication, delayed feedbacks, off-topic/hostile remarks, not being able to hear tones of voice and so forth (Wright, 2000b, 2002). Some of these factors, such as encountering hostile remarks, significantly reduced perceived emotional support among online support group users (Wright, 2002). The occurrence of hostile remarks might be a consequence of considering computer-mediated support groups as weak tie networks (Wright & Bell, 2003).

The strength of interpersonal ties is usually evaluated based on the amount of time spent in maintaining the relationship, emotional intensity, mutually confided intimacy and reciprocal services embedded in the relationship (Granovetter, 1973). Normally, strong ties and weak ties are divided. Friends and family members are usually considered as strong ties. Weak ties, on the other hand, refer to the relationships that take place between people who may regularly communicate but are not necessarily close. Prior to the Internet, neighbors, people known from work, and others who people can turn to help during stress besides strong ties were considered as weak ties. Information from strong and weak tie networks function differently. As sources from strong tie social networks are often considered more credible, strong tie networks are more influential on personal decisions. Weak tie networks often consist of heterogeneous members who do not share demographic characteristics or life experiences. Therefore, weak tie networks are more effective to facilitate diffusion of innovative and diverse information (Granovetter, 1973; Weenig & Midden, 1991). Wright and Bell
(2003) argued that since people consider computer-mediated health support groups as weak tie networks, insensitive and hostile messages may be presented within these support groups. The presence of these hostile messages, as argued before, might influence other users’ perceptions of the supportiveness of the groups (Wright, 2000). As a consequence, it may influence people’s willingness to engage in supportive interactions and how much trust they give to the support provided by other users. Since not much empirical work has been conducted in this area, a research question instead of a directional hypothesis is asked as following:

\[ RQ_1: \text{How did weak tie concerns (i.e., perceived vulnerability, perceived security concern, relational motivation of Internet use) influence people’s responses to supportive messages and willingness of engaging in supportive interactions?} \]

**Interaction effects of narrative exposure and social support**

As reviewed before, people who are exposed to narratives are more likely to experience emotional, attitudinal and behavioral changes by engaging in the narratives and identifying with the characters (Green & Brock, 2002; Slater & Rouner, 2002). Online health support groups provide users a chance for narrative engagement as many users reveal their personal stories to seek help on these groups (Preece, 1999). Users of online health support groups who read others’ personal stories and strongly identify with the authors would perceive a need of being supported as same as the authors. Therefore, they would evaluate the support group to be most supportive when they found the authors received sensitive supportive messages such as messages at a high level of person-centeredness, as reviewed before. In contrast, when they hold the high desire of being supported but encounter insensitive supportive messages actually such as the messages at a low level of person-centeredness in the online health support group, the discrepancy between their expectation and the reality would make them evaluate the support group to be less supportive. This expectation-reality
gap may not be salient when people read a non-narrative message as their desires of being supported will not be aroused by the message. Therefore, the following hypothesis is proposed:

$$H_6:$$ An interaction effect of narrative exposure and social support will be found on perceived supportiveness of the online health support group. Specifically, participants in the narrative and emotional support condition would rate the online health support group most supportive while participants in the narrative and non-emotional support condition would rate the online health support group least supportive.

Exposure to personal stories and supportive messages at different levels of person-centeredness may not only influence users’ perceptions of online health support groups, but also influence how users want to interact with other users. By observing role models of online health support groups revealing personal stories and providing and receiving support, people may decide to participate in these groups to share their own stories. The literature review for the next section will introduce ways that people might use to generate personal narratives in participating in online health support groups and the consequential health outcomes.

**Disclosure, Reconstruction and Health**

A great amount of studies have suggested that disclosure of one’s disturbing experience is positively related to people’s physiological and psychological well-being (Gray, 2009; Graybeal, Sexton & Pennebaker, 2002; Pennebaker & Seagal, 1999; Smyth, 1998). Online health support groups provide room for users to disclose their disturbing experience and a social network that they can get support after disclosing their negative experience. As scholars noted, online health support groups could facilitate insightful disclosure, which is related to positive change in psychological and physical well-being (Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006).
Self-disclosure and CMC

Self-disclosure is a means to build trust and meaningful interpersonal relationships (Joinson & Paine, 2007; Wheeless, 1976). Although self-disclosure can serve different purposes (Papacharissi, 2002), it usually occurs among a dyad of people to increase shared understandings. Wheeless and Grotz (1976) defined self-disclosure as “the process of communication through self-disclosive messages” (p. 338). A similar definition was given by Kim (2009), claiming self-disclosure is “making a presentation of self” (p. 8).

Self-disclosure can be understood both as a personality trait and as a situated interactional practice (Wheeless, 1976; Antaki, Barnes, & Leudar, 2005). Some people are inclined to disclose more about themselves than other people in general. These people are usually rated higher in their openness. In this sense, self-disclosure is considered as a personality trait. However, an individual’s general openness could be overridden by situational interactional relationships as well (Cho, 2007, Wheeles, 1976). Imagining a person with medium level of openness experiencing some troubles in life, he might want to disclose himself deeply to a close friend while not mentioning any of his problems with his co-workers. Antaki, Barnes and Leudar (2005) defined self-disclosure as a “social performance which must be brought off in interaction” (p. 181). They emphasized that self-disclosure is the “designed information” given by the discloser voluntarily about himself/herself. This information is usually presented by the discloser using extreme words to sound significant in certain circumstances. Cho (2007) conceptualized self-disclosure as “strategic individual behavior” (p. 339). He noted that discloser could intentionally control the information he/she discloses.

Self-disclosure as an important part in developing interpersonal relationships is influenced by many relational variables. Wheeles (1976) identified interpersonal solidarity a reliable predictor of self-disclosure. Interpersonal solidarity refers to the idea of getting close with others, developing in-group identity, and establishing mutually close relationships, depending on 1) perceived
similarities of personal characteristics such as age and attitudes with others, 2) perceived closeness with others in physical space and social space, 3) emotional bonds with others such as attraction, likeness, sympathy and trust, 4) interactional actions with others such as cooperation and reciprocal behaviors, and 5) symbolic expressions of similarity and intimacy. As interpersonal solidarity goes beyond similarities of personal characteristics and interpersonal trust, Wheeless (1976) argued that self-disclosure is one of the attributes of high solidarity relationships. In two studies using an undergraduate students sample and a non-student adult sample, Wheeless (1976) found reported self-disclosure was higher in perceived higher solidarity relationships in both samples.

One characteristic of interpersonal solidarity - reciprocal interactions within a dyad of people - has been emphasized by a group of scholars. They claimed that people tend to avoid self-disclosure if they sense the communication is one-way and not reciprocal (Altman & Taylor, 1973; Detenber, Wijaya & Goh, 2008; Moon, 2000; Joinson, 2001a, 2001b). Altman and Taylor (1973) illustrated that the process of social penetration, which refers to observable interactive behaviors such as the exchange of self-disclosure, must be a function of interpersonal rewards and costs. Joinson (2001a, 2001b) argued that to motivate candid self-disclosure from others, it is important to disclose self first. By manipulating the disclosure of the experimenter, he found participants randomly assigned in conditions where they first observed the disclosure of the experimenter gave out significantly more information about themselves. Moon (2000) noted the rule of perceived reciprocity for self-disclosure was also true in human-computer interaction. Participants in this study were interviewed by computers. In reciprocal conditions, computers disclosed the nature about itself, such as its configuration speed and how disappointing it is that this high speed was not fully taken advantage by its users. Later, participants were interviewed by the computers about their own disappointing life experiences. Moon (2000) found in reciprocal conditions, participants tended to reveal more information and more intimate information.
Joinson (2001a, 2001b) emphasized the potential of using computer-mediated communication to achieve higher self-disclosure. Studies showed that anonymity of the medium may make people end up with revealing more intimate information (Wallace, 1999). However, since self-disclosure refers to communication that makes intimate information known to other people, this “high-risk” behavior may possibly lead to emotional hurt, physical harm, or material damage (Moon, 2000). Therefore, privacy concerns may inhibit self-disclosure online. Recently, many studies have suggested that people have increasingly had consumer privacy concerns towards online communication (Gibbs, Lai, & Ellison, 2009; Joinson & Paine, 2007; Miyazaki, Stanaland & Lwin, 2009; Sobel, 2000). Miyazaki, Stanaland & Lwin (2009) conducted research to help parents to prevent preteen children from disclosing personal information online. They pointed out that these children are especially vulnerable as many advertisers used their disclosed information to design tailored messages to target them. Empirical evidence has suggested that risk concerns constrained people’s self-disclosure online (Gibbs, Lai, & Ellison, 2009).

In addition, relational motivations of Internet use may also influence online self-disclosure patterns (Berger & Archer, 1982; Cho, 2007; Kim, Klautke & Serota, 2009). Cho (2007) found adolescents with the motive of forming interpersonal relationships online provided the highest amount of information during online chatting. However, as reviewed before, considering online social support groups as weak tie networks may prevent people from expecting to establish meaningful interpersonal relationships online, which in turn may inhibit people’s self-disclosure in Internet health support groups (Bell & Wright, 2003).

**Disclosure and health**

The power of storytelling by patients has long been recognized in the medical sciences. Many medical programs have trained health professionals to listen to patients’ stories. Skills of interacting with patients to search for meanings have also been emphasized in medical schools (Gray,
2009). In psychotherapy, clients are often encouraged to tell a story about their traumatic experiences. Through constructing a narrative, it is believed that the clients actively process and re-construct their experiences and find new meanings for the events (Angus, Lewin, Bouffard & Rotondi-Trevisan, 2004; Goffman, 1974).

Many explanations have been provided to understand the relationship between narrative construction and health benefits. Not telling one’s disturbing experience is considered as an inhibition behavior. Scholars are concerned that traumatic experiences, if consciously avoided or inhibited by people, would lead to suppressed memory. The negative emotions associated with the experience would exist in the form of anxiety (Pennebaker & Beall, 1986). Scholars have claimed that inhibition of one’s thoughts or behaviors would not only lead to psychological harm but also physical harm. People who have long actively inhibited their thoughts are more likely to report stress and stress-related diseases (Graybeal, Sexton, & Pennebaker, 2002).

Emotional expressive writing is reported to be able to reduce avoidance thoughts (Smyth, True & Souto, 2001), reduce activity restriction (Smyth, True & Souto, 2001), increase psychological well-being (Smyth, 1998), increase physiological well-being (Smyth, 1998), and increase health behaviors (Pennebaker & Beall, 1986). Smyth, True and Souto (2001) found that to instruct people to form a narrative about an illness experience would reduce people’s intrusive/avoidant thoughts over time. People who wrote their experiences in a narrative format also reported less activity restriction. Therefore, the author claimed that forming a narrative has a potential to lead to health benefits. A meta-analysis conducted by Smyth (1998) found that people who were assigned to emotional expressive writing conditions usually demonstrated better psychological well-being, physiological functioning, general functioning and reported physical health compared with participants who were instructed to inhibit emotional expressions in writing. The meta-analysis also revealed that men benefited more from emotional expressive writing than
women. The outcome was stronger when the emotional expressive writing intervention lasted longer. Although the meta-analysis did not find a possible impact of story-making on health behaviors, Pennebaker and Beall (1986) found people who were instructed to form a narrative demonstrated significantly more doctor visits after six months. Theories in narrative psychotherapy addressed components of self-disclosure that could potentially have positive effects.

**Narrative processes model.** The narrative processes model (Angus & Hardtke, 1994; Angus, Lewin & Hardtke, 1996; Angus, Levitt & Hardtke, 1999; Angus, Lewin, Bouffard & Rotondi-Trevisan, 2004) claims that a narrative usually contains three different modes: articulation, elaboration and transformation. Articulation refers to an individual’s effort to recall one’s experience. It is recognized as “external narrative sequences” in the model. In psychotherapy, articulation is fundamental to further therapy treatments. It helps the clients realize the memory that they unconsciously forgot and unacknowledged and make them better understand the meanings of these experiences. Elaboration refers to the narrative process revealing subjective feelings and innermost emotions associated with the event happened in reality. Different from retelling the event as what articulation is about (referred as external mode), disclosure of feelings is considered as “internal narrative sequences”. In psychotherapy, elaboration enables the clients to share their feelings with the therapists. A release of subjective feelings, especially among people experiencing traumatic events, is often considered to be positive towards people’s psychological well-being (Kim, 2009; Pennebaker & Seagal, 1999). Transformation refers to the narrative process constructing new meanings for the event. It won’t be surprising that the new meanings reconstructed could challenge one’s previous beliefs. This mode is recognized as the “reflexive narrative sequences” in the model where people tend to reflexively analyze their experiences and emotions. It serves the goal of psychotherapy that the therapists are expected to help the clients to “re-live the event” and “form
new understandings about the self and others” (Angus, Lewin, Bouffard & Rotondi-Trevisan, 2004, p. 89).

Hardtke (1996) found different therapeutic approaches (i.e., the client-centered approach versus the process-experiential approach) produced different percentages of external, internal and reflexive narrative sequences. With reflexive narrative sequences are approximately equally weighted in two approaches, the client-centered approach of psychotherapy produced far more external narrative sequences than the process-directive approach, while the process-directive approach produced far more internal narrative sequences than the client-centered approach. Furthermore, Hardtke (1996) found shifts from external narrative sequences to reflexive narrative sequences are the most prominent shift patterns in therapeutic sessions regardless of the therapeutic modalities. Lewin (2001) compared the shifts of narrative sequences in therapeutic dyads with good outcomes and with poor outcomes. She found that the successful therapy involved unique interactions between the therapist and the client. More specifically, good outcome PE (short for process-experiential approach) therapists initiated significantly more shifts from reflexive narrative sequences to internal narrative sequences while clients responded by initiating more shifts from internal narrative sequences to reflexive narrative sequences compared with poor outcome PE therapeutic sessions.

*Narrative coherence.* Since traumatic experience may lead to fragmented memory and disordered store of information, it is normal to tell incoherent stories with broken sentences and contradictions. Research has found that clients who lack narrative coherence in psychotherapy sessions reported lower subjective well-being after their psychotherapy experiences (Adler & McAdams, 2007). Coherent narratives, on the other hand, refer to well-structured stories (Bruner, 1990). Narrative coherence is considered as “sustaining a sense of continuity, directionality and meaning” (Androutsopoulou, Thanopoulou, Economou & Bafiti, 2004, p. 385). Coherent narratives
demonstrate better understandings of the disturbing experience, and are related to problem-solving (Androutsopoulou, Thanopoulou, Economou & Bafiti, 2004; Fiese & Wamboldt, 2003; Gergen, 1994). Therefore, promoting self-narrative coherence is seen as a therapy.

Scholars have developed many ways to operationalize narrative coherence. Structure, emotional significance and consistency, and integration have been used by many scholars to assess narrative coherence (Androutsopoulou, Thanopoulou, Economou & Bafiti, 2004; Baerger & McAdams, 1999; Burnell, Hunt, & Coleman, 2009). A structured narrative often refers to storytelling in relational manner, such as presenting events in an appropriate order and emphasizing causal links or temporal order of events. Elaboration of emotions is also valued by scholars when assessing narrative coherence. Burnell, Hunt and Coleman (2009) stressed the importance of emotional consistency. For example, the emotions a narrator expresses should be consistent with the nature of the event told in the disclosure. In addition, in the same meaning unit, verbal and non-verbal expressions of emotions must be congruent too when a coherent narrative is achieved. Integration of a narrative assesses whether contradictions are present in a narrative and whether the contradictions are acknowledged and explained by the narrator. Androutsopoulou, Thanopoulou, Economou and Bafiti (2004) used whether the narrator could acknowledge or respond to the needs of the audience as an additional criteria of assessing narrative coherence.

As reviewed before, online health support groups facilitate the exchange of personal stories and empathy (Preece, 1999; Preece & Ghozati, 2001). Sharing one’s story and empathy to others in online health support groups could satisfy people’s needs of catharsis. Meanwhile, the disclosure of a negative experience itself can help people reveal negative feelings (Weinberg, Uken, Schmale and Adamek, 1995). Studies have suggested that writing a post in online health support groups can help people reconstruct their disturbing experience and find new meanings about their lives (Kim, 2009; Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006). In a longitudinal study involving women
diagnosed with breast cancer, Shaw, Hawkins, McTavish, Pingree and Gustafson (2006) found women who disclosed themselves insightfully in the computer-mediated communication support group re-conceptualize their traumatic experience. As a consequence, negative emotions were reduced among these women. Kim (2009) observed postings about body image occurred in an online discussion forum at the website of Dove’s Campaign for Real Beauty. She found people who posted in the discussion forum expressed their feelings about being hurt as mass media objectify bodies. These results reflected the catharsis function of disclosing online. More importantly, she observed that some of the posters addressed how they tried to overcome the negative media effects and deliver their own definitions of beauty to other people. These posts indicated reconstruction of daily experiences.

Although previous research offers evidence that self-disclosure in online health support groups may bring benefits to people’s health, little research has been conducted to examine how personal narratives could be influenced by the existing messages that people encountered in these groups. Self-disclosure is a strategically constructed practice that is sensitive to existing communication interactions (Antaki, Barnes & Leudar, 2005; Cho, 2007). All messages received might influence how people generate their personal narratives. Especially, an interaction effect of narrative exposure and observed social support could be found on information disclosed in personal narratives. When people see others who disclosed personal stories not receiving sensitive support, lower perceived supportiveness of the online health support group may prevent them from revealing their own experiences. They may disclose less intimate information, reveal fewer feelings, generate more counter-arguments in personal narratives and so forth. To explore how personal narratives could be influenced by existing interactions in the online health support group, the following research question is asked:
**RQ2:** How personal narratives were constructed when encountering different messages (i.e. narrative vs. non-narrative messages, and emotional supportive vs. non-emotional supportive messages vs. non-support)?

Furthermore, previous research that claimed the benefits of self-disclosure on health was rarely conducted in the area of health persuasion to examine how it impacts attitudinal and behavioral changes. Since generating personal narratives could help people reconstruct their experiences, which may help people find the correct behavioral path to maintain health status, components of personal narratives related to attitudinal and behavioral changes will be explored in this study. Therefore, the following research question is asked:

**RQ3:** What components of personal narratives were related to positive changes in attitudes and behavioral intentions?

### Summary of Hypotheses and Research Questions

As the narrative persuasion literature suggested, when people read narrative stories, they would go through different information processing processes compared with reading argument-based persuasive messages (Green & Brock, 2002; Slater & Rouner, 2002). When reading narrative stories, the audience members tend to be get immersed into the narrative world, identify with the narrative characters, and temporarily lose access to the real world where they actually live. As a result, they would be less likely to generate counter-arguments based on their life experiences (Gerrig, 1993; Green & Brock, 2002, Meng, 2009; Slater & Rouner, 1996). As the narrative stories are more emotionally arousal compared with non-narrative messages, narrative exposure would elicit greater emotional responses and greater interpersonal discussion after narrative exposure (Dunlop et al., 2008; Kopfman et al., 1998; Slater & Rouner, 2002). In the context of online health support groups, greater interpersonal discussion could be represented by greater willingness of writing a response or willingness to share more personal information by writing a longer response to existing messages.
Therefore, hypotheses 1, 2, 3 were proposed as followings. Figure 1 illustrates the suggested relationships.

\( H_1 \): Participants in narrative conditions will generate fewer counter-arguments than participants in non-narrative conditions.

\( H_2 \): Participants in narrative conditions will produce greater emotional responses (i.e., sympathy) than participants in non-narrative conditions.

\( H_3 \): Participants in narrative conditions will demonstrate greater willingness of online health support group participation, represented by a) a greater ratio of participants in narrative conditions would write a response, or b) write a longer response to share more information, than participants in non-narrative conditions.

\textit{Figure 1}. Narrative exposure and outcomes.

\begin{center}
\begin{tikzpicture}[node distance=2.5cm, >=stealth]
  \node [circle, draw] (narrative) {Narrative exposure};
  \node [circle, draw, right of=narrative, xshift=3cm] (counter) {Counter-arguments};
  \node [circle, draw, below of=counter] (arguments) {Emotional responses};
  \node [circle, draw, below of=arguments] (participation) {Willingness of online health support group participation};
  \node [above of=counter, xshift=-1cm] (h1) {H1};
  \node [above of=arguments, xshift=-1cm] (h2) {H2};
  \node [below of=participation, xshift=-1cm] (h3) {H3};
  \draw [->] (narrative) -- (counter);
  \draw [->] (narrative) -- (arguments);
  \draw [->] (narrative) -- (participation);
\end{tikzpicture}
\end{center}

In addition, as previous literature suggested, narrative engagement mediates narrative persuasion. In other words, if audiences had stronger identification with the narrative characters or demonstrated greater transportation into the narrative story, stronger persuasion outcomes are more likely to be resulted (Cohen, 2001; Green & Brock, 2000). Therefore, hypothesis 4 was proposed as following. Figure 2 illustrates the suggested relationships.
H₄: Narrative engagement (including identification and transportation) mediates a) the negative relationship between narrative exposure and counter-argument, b) the positive relationship between narrative exposure and emotional responses, c) the positive relationship between narrative exposure and willingness of online health support group participation, d) the positive relationship between narrative exposure and attitudes, and e) the positive relationship between narrative exposure and behavioral intentions.

*Figure 2.* Mediation effects of narrative engagement.
Social support literature suggests that people are sensitive to existing social interactions. People would rate the support group more supportive after reading sensitive supportive messages, followed by after reading less sensitive supportive messages and encountering no supportive replies (Burleson, 2009; Burleson & Mortenson, 2003; Cappella & Klein, 2006; Cunningham & Barbee, 2000; Jones, 2004). Therefore, hypothesis 5 was proposed as following.

$H_5$: Participant in emotional support conditions would rate the online health support group most supportive, followed by participants in non-emotional support conditions and participants in non-support conditions.

Since sensitive supportive messages might meet people’s expectations after reading a narrative story, the interaction of narrative exposure and social support might be found on perceived supportiveness. Therefore, hypothesis 6 was proposed as following.

$H_6$: An interaction effect of narrative exposure and observed social support will be found on perceived supportiveness of the online health support group. Specifically, participants in the narrative and emotional support condition would rate the online health support group most supportive while participants in the narrative and non-emotional support condition would rate the online health support group least supportive.

*Figure 3.* Social support and perceived supportiveness.
This study also explored how personal stories, existing supportive interactions, and weak tie network concerns would influence how people generate written responses to participate in online health support groups, and how these written responses would influence people’s health attitudes and behavioral intentions. Three research questions were asked as followings. Figure 4 summarizes the possible relationships.

*RQ1:* How did weak tie concerns (i.e., perceived vulnerability, perceived security concern, relational motivation of Internet use) influence people’s responses to supportive messages and engagement in supportive interactions?

*RQ2:* How personal narratives were constructed when encountering different messages (i.e. narrative vs. non-narrative messages, and emotional supportive vs. non-emotional supportive messages vs. non-support)?

*RQ3:* What components of personal narratives were related to positive changes in attitudes and behavioral intentions?

*Figure 4.* Summary of research questions.
Chapter 3

Methodology

Experimental design

An experiment was conducted to answer the preceding research questions and test the hypotheses. Previous studies using content analyses have identified the two major message genres of online health support groups: personal stories and empathic messages (Preece, 1999). Other studies presented benefits of using these groups psychologically and physically (Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006; Wright, 2000, 2002a, 2002b). However, little research has been conducted to examine what responses would be developed when people are exposed to these messages and whether exposure to these messages in particular would lead to the benefits that were previously reported by these users. To explore the value of online health support groups, this study examines the effects of personal stories and empathic messages on group participation, group evaluation and health persuasion outcomes.

To achieve this goal, an experiment with a 2 (narrative vs. non-narrative exposure) X 3 (emotional support vs. non-emotional support vs. non-support) factorial design was conducted. Web pages of an online health support group dealing with college stress were created. A control group was added to compare how much information and what type of information people would disclose when they are asked to discuss college stress. The experiment was also designed to investigate people’s cognitive and emotional responses, attitudes and behavioral intentions to perform recommended behaviors after exposure to the messages in the online health support group.
Health issues

College stress was selected as the health context of this dissertation. Stress-related diseases, including anxiety and depression, are two major causes of illness and death in the United States. A telephone survey conducted by the CDC in 2006 found that 15.7% of the U.S. population was diagnosed with depression and 11.3% of the population was diagnosed with anxiety at some point in their lifetime. Overall, females are more likely to develop and be diagnosed with stress-related diseases than males. Furthermore, the survey found that the percentage of the population experiencing stress is higher among people with chronic diseases. This latter detail is especially concerning, as this experienced stress could worsen long-term patients’ health situations and quality of life (CDC, 2006).

Stress has also been listed by the CDC as one of the most common health issues that college students experience in addition to eating disorders and diet changes, fatigue and sleep deprivation, relationships and sexual violence, substance use, and sexually transmitted diseases (CDC, 2009a). In fact, stress has been listed as the number one issue influencing the health of college students at many universities (i.e., Michigan State University, 2007; University of Michigan, 2009). Nine of the eleven Big Ten Universities presented information about stress and tips for dealing with stress on their university health services websites. Stress in college could be caused by many reasons, including adjusting to a new environment, academic pressure, financial pressure, relationship pressure, and so forth. Symptoms of being stressed may include physical signs, such as headaches, elevated heart rate, increased blood pressure, and a weakened immune system as well as emotional signs, such as irritability, anxiety, and mood swings. Furthermore, stress often leads to sleep disorders and other sleep-related problems. Using a college student sample, Lund, Reider, Whiting, and Prichard (2010) found that insufficient sleep and irregular sleep patterns are two major sleep problems among this
population. Among all factors that could cause these sleep problems, they found stress to be the strongest predictor of sleep quality (Lund et al., 2010).

On the other hand, sleep has been considered by multiple medical sources as an effective strategy to manage stress (CDC, 2009b; NSF, 2009). Brochures provided by student health centers at many universities emphasize getting a sufficient amount sleep to deal with stress (Indiana University Health Center, 2008, Purdue University Student Health Center, 2008; University of Iowa Student Health, 2009; University of Michigan University Health Services, 2009; University of Wisconsin University Health Services, 2007). However, it has been a challenge for many health campaigns to increase public awareness about the significant role sleep plays in daily life and the serious health consequences associated with sleep problems. This challenge arises from the fact that a large amount of people tend to think lack of quality sleep is not a serious problem (CDC, 2009c; NSF, 2007). Due to the significant need to increase awareness about the importance of sleep and the connection between sleep and stress, sleep was used as the secondary health context in this dissertation. Strategies for maintaining quality sleep and a sufficient amount of sleep were emphasized in the experimental stimuli as necessary strategies to deal with stress.

A pilot study was conducted to investigate whether college stress is a practical issue for this study. Participants were recruited from a small class at an eastern university \((N = 16)\). Students were asked to evaluate several health issues that are prominent on college campuses. They were asked how significant they thought the issues are among college students and how likely they would like to blog about these issues online. Participants were not directly asked about how likely they would like to discuss the issue using online health support groups because this particular medium might be unfamiliar to them. While discussing a health issue on a blog is also related to participants’ beliefs on appropriateness of sharing personal health information online, it is reasonable to assume that
participants’ likelihood to blog about a health issue is correlated with the likelihood to discuss the issue using online health support groups.

Table 1 presents the results of this pilot study. College stress was considered to be the number one health issue ($M = 6.37, SD = .89$) for these students among other various issues, including sleep, nutrition, physical activity, alcohol use, and tobacco use. Furthermore, stress was also the number one issue that college students reported they would like to discuss online ($M = 4.31, SD = 2.24$). The pilot study results suggested that college stress is a potentially high involvement scenario for college students. Since this study aims to explore participants’ responses in online health support groups, selection of a high involvement issue increased the external validity of this study. If people are not involved in a health issue, they have no particular reason to seek support and information using online health support groups. Therefore, the pilot study results justified the selection of college stress as the major health context for this study.

Table 1. Evaluations of health issues (pilot study 1).

<table>
<thead>
<tr>
<th></th>
<th>Significance of the Issue</th>
<th>Likelihood to Blog</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$M$</td>
<td>$SD$</td>
</tr>
<tr>
<td>Sleep</td>
<td>5.69</td>
<td>1.14</td>
</tr>
<tr>
<td>Nutrition</td>
<td>5.69</td>
<td>1.08</td>
</tr>
<tr>
<td>Physical activity</td>
<td>5.50</td>
<td>1.15</td>
</tr>
<tr>
<td>Stress</td>
<td>6.37</td>
<td>0.89</td>
</tr>
<tr>
<td>Alcohol use</td>
<td>5.81</td>
<td>1.47</td>
</tr>
<tr>
<td>Tobacco use</td>
<td>4.44</td>
<td>1.26</td>
</tr>
</tbody>
</table>

*Note:*

a. Please evaluate how much you think the following issue is a significant health issue among college students, 1 = *Not a significant issue at all*, and 7 = *A very significant issue*.

b. Please evaluate the likelihood you may blog about the following health issue if you were a freshman college student, 1 = *not possible at all*, and 7 = *very possible*.

**Participants**

A total of 254 participants enrolled in a large undergraduate introduction level communication class at an eastern University were recruited to participate in the actual study of dissertation. The sample was composed of more females than males (female: 63.5% and male: 
36.5%). Participants were from diverse class standings with relatively less senior students involved (Freshman: 31.7%, Sophomore: 34.5%, Junior: 23.8%, and Senior: 9.9%). They ranged from 18 to 40 years old ($M = 19.55$, $SD = 1.81$). The majority of the participants were Caucasian American (Caucasian American: 85.2%, African American: 2.8%, Asian American: 3.2%, Hispanic American: 3.6%, Multi-racial American: 2.4%, and International: 2.0%).

The majority of the participants reported they have experienced college stress lately (98.8%) and at least one of the sleep problems during their daily life (96.6%). On scales from 0 to 6, they reported moderate level of stress lately ($M = 4.10$, $SD = 1.39$), moderate level of frequency of experiencing stress during daily life ($M = 4.21$, $SD = 1.38$) and moderate level of frequency of experiencing sleep problems during daily life ($M = 3.67$, $SD = 1.66$).

**Procedures**

Potential participants received a web link. By clicking the link, they were directed to the informed consent form of the study followed IRB instructions. If they agreed to participate in the study, they were then randomly assigned to one of the seven conditions, including six treatment conditions and one control condition. In the treatment conditions, participants were first exposed to experimental stimulus/stimuli. They were either exposed to one online health support group message (non-support conditions) or three online health support group messages (emotional support or non-emotional support conditions) focusing on college stress. They were then asked to disclose their own experience of college stress. After that, they were asked to respond to a series of measures including manipulation checks, perceptions of the online health support group, identification with people who suffer from stress, transportation experience, emotional reactions, attitudes and behavioral intentions. Participants were also asked to respond to individual difference measures such as relational motivations of Internet use, involvement with college stress and sleep problems and so forth. In the control group, participants were not provided with a health message but were asked to imagine they
encountered an online health support group about college stress when they were browsing the Internet. They were asked to disclose their own experience about college stress to participate in the online health support group. They were then asked to respond to the same measures as participants in treatment conditions except for the manipulation checks, perceptions of the online support group, identification with previous post authors and transportation experience.

**Manipulations and experimental stimuli**

To examine the impact of personal stories and supportive messages on online health support group users, two variables were manipulated: narrative exposure and social support. Six web pages of online health support group dealing with college stress were created. Using simulated web pages has been often seen in Internet-related experimental research (Sundar, Kalyanaraman & Brown, 2003; Hu & Sundar, 2010). One risk associated with this particular manipulation is participants may evaluate these web pages low on scales of perceived realism. Perceived realism was not measured in this study and should be addressed further.

Narrative exposure was manipulated by changing the format of the main message shown in the online support group (see Appendix B). Following Bruner’s definition of narrative (1986), a personal story with a clear beginning, middle and end was told in narrative conditions. The author of the main message described her experience of being stressed out during her first year of college. The story was very detailed and was full of feelings and personal information. In non-narrative conditions, the main message of the online support group about college stress was presented in a non-personal way. It was composed of arguments claiming the prominence of college stress phenomenon and its negative influence on the health of college students with supporting evidence and reasoning. Main messages in both narrative and non-narrative conditions emphasized sleep loss as a main co-occurrence of stress. Meanwhile, to maintain sufficient sleep was featured as the solution to reduce the level of stress. Related symptoms of stress were included in the messages.
Strategies of maintaining sufficient and quality sleep were presented at the end of the messages as recommended behaviors to deal with stress. All health-related information provided in the experimental stimuli was based on health information found on credible health websites such as CDC, NSF and NIH. Specific wordings of manipulated messages are presented in Appendix B.

Social support was manipulated at three levels: emotional support, non-emotional support, and non-support. In emotional support conditions, two reply messages were drafted in a way displaying that the respondents first empathized with the author of the main message who suffered from college stress. They then shared their own experiences of college stress and sleep problems in order to ensure the author of the main message will not feel isolated. At the end of the reply messages, the two authors showed positive ways to deal with stress and sleep problems and sent best wishes to the main message author. In non-emotional support conditions, two reply messages contained the same strategies to deal with college stress and sleep problems that were mentioned through personal experiences in emotional supportive messages. However, the authors did not empathize with the main message author when forming their replies. Oppositely, they tried to state that stress is a normal part of life and that people should not feel too bad about it. To keep the non-emotional supportive messages the same length as the emotional supportive messages, web links discussing additional strategies of coping with college stress and sleep problems were provided at the end of the messages. In non-support conditions, no reply message was provided. In other words, in non-support conditions, participants only read one main message which was either narrative or argument based. Specific wordings of manipulated messages are presented in Appendix B.

Variables and measures

Narrative vs. non-narrative manipulation checks. As a check to examine whether purposive manipulations on narrative and non-narrative messages work, participants were asked to respond to four measures to examine whether they thought the main message of the online health support group
that they just read was narrative based or not. Using 7-point Likert scales, the participants were asked whether 1) 0 = the message provides information using a general voice and 6 = the message provides information using a 1st person voice; 2) 0 = the message emphasizes factual information and 6 = the message emphasizes personal information; 3) 0 = the message is informational and 6 = the message is emotionally arousal; and 4) 0 = a character could not be easily identified in the message and 6 = a character could be easily identified in the message. The measures were created by modifying existing measures aimed at differentiating narrative versus non-narrative messages (Parrot, Silk, Dorgan, Condit & Harris, 2005). The four-item scale was reliable (α = .83). Therefore, an overall mean was calculated for each individual participant. An independent t-test showed that participants in narrative conditions perceived the main message as significantly more of a narrative (M = 3.94, SD = 1.11) than participants in non-narrative conditions (M = 2.05, SD = 1.35), t(201.93) = -11.18, p < .001. Therefore, the manipulation worked successfully.

**Perceived message persuasiveness.** Four questions were asked to examine whether participants perceived the message differently in narrative versus non-narrative conditions besides being aware of the narrative or the non-narrative focus of the message. They were asked to rate whether the message is not persuasive/persuasive, not credible/credible, not believable/believable, and not easy to understand/easy to understand. Seven-point Likert scales were used where 0 is equal to the lowest end of each scale such as not persuasive, and 6 is equal to the highest end of each scale such as persuasive. The four-item scale was reliable (α = .72). Therefore, an overall mean was calculated for each individual participant. An independent t-test was conducted. The non-narrative message (M = 4.38, SD = 1.05) was perceived significantly more positive than the narrative message (M = 4.02, SD = 1.02), t(206) = 2.49, p < .05. Therefore, perceived message persuasiveness was included as a control variable in further analysis.
Perceived length of the message. Two questions were asked to examine whether participants perceived the narrative message and the non-narrative message similarly long. They were asked to rate whether the message is too short/too long, and contains not enough information/has too much information. The two-item scale was reliable ($r = .43, p < .001$). Therefore, an overall mean was calculated for each individual participant. An independent t-test was conducted. No statistical significance was found on perceived length between the two messages, $t(208) = -.38, p = .70$.

Social support manipulation checks. As stated before, social support was manipulated at three levels: emotional support, non-emotional support, and non-support. Participants read two reply messages in either emotional or non-emotional support conditions and did not read any reply message in non-support conditions. Participants were asked to evaluate the reply messages in terms of whether the responses were not sympathetic/sympathetic, not caring/caring, discouraging/encouraging, and cold/warm in emotional support or non-emotional support conditions. As participants did not receive any reply message in non-support conditions, they were asked to report their perceptions of other users in the online health support group using the same measures. Seven-point Likert scales were used where 0 is equal to not sympathetic, not caring, discouraging or cold and 6 is equal to sympathetic, caring, encouraging, or warm. The four-item scale was reliable ($\alpha = .93$). Responses to each item were added together and then an overall mean was calculated for each person. An ANOVA test was conducted and the result revealed that people in different support conditions responded to the support manipulation checks significantly differently, $F(2, 202) = 42.08, p < .001$. Holm’s sequential post-hoc comparisons demonstrated that participants in emotional support conditions ($M = 4.74, SD = 1.04$) reported significantly higher on the manipulation check measures than participants in non-emotional support conditions ($M = 3.26, SD = 1.39$) and non-support conditions ($M = 3.04, SD = .95$).
**Perceived emotional support.** Six measures based on modifications on existing scales (Barrera et al., 2002; Xu & Burleson, 2001) were used to investigate whether people could feel less emotionally isolated and emotionally stronger by attending the online health support group. Example measures included “I could locate someone who really understands my experience by attending e-support forums like this”, “I could feel much less lonely by attending e-support forums like this”, and “I could locate someone who provides me with hope or confidence by attending this e-support forum”. The participants were asked to respond whether they agree with these statements on 7-point Likert scales where 0 = *strongly disagree*, and 6 = *strongly agree*. The 6-item scale was reliable (α = .90). Therefore, an overall mean was calculated for each person.

**Perceived informational support.** Different from perceived emotional support, perceived informational support captures the idea whether people perceive others are available to provide advice and suggestions to solve a problem. Four measures that measured perceived informational support were “I could be connected with people whom I may turn to for help by attending e-support forums like this”, “I could locate someone to give me advice about what to do by attending this e-support forum”, “I could locate someone to analyze my situation and tell me about available choices and options by attending this e-support forum”, and “I could locate someone who will help me find out the answers to my questions about my stress by attending this e-support forum”. These measures were created by modifying existing scales (Barrera et al., 2002; Gustafson et al., 2005; Houston, Cooper & Ford, 2002; Xu & Burleson, 2001). The participants were asked to respond whether they agree with these statements on 7-point Likert scales where 0 = *strongly disagree*, and 6 = *strongly agree*. The four-item scale was reliable (α = .90). Therefore, an overall mean was calculated for each person.

**Perceived risk.** Three measures were used to investigate whether people would perceive personal risks when participating in the online health support group. The three measures were “I
believe other users in this e-support forum won’t make fun of my experiences” (reverse coded), “I won’t be hurt by telling my story in this e-support forum” (reverse coded), and “I think some people/agencies may take advantage of me or misuse my information if I disclosed too much about myself in this e-support forum”. The reliability was low for these three measures ($\alpha = .40$).

Meanwhile, reliability analysis suggested if the third measure was deleted, the Cronbach’s alpha for the other two measures would increase to .74. The result was valid as the first two items covered perceived risk coming from interactions with other users of the online health support group, while the third item was a security concern of personal data being taken over by agencies for malevolent uses. Therefore, a new variable named *perceived vulnerability* was created by reverse coding the first two items and calculating means for the items. The two-item scale of perceived vulnerability was reliable ($r = .59, p < .001$). In addition, the third item was considered as a separate measure labeled as *perceived security concern*.

**Emotional responses.** Participants were asked to report their emotional reactions after reading the messages. Emotional reactions were measured on 7-point Likert scales where 0 = *none of this feeling* and 6 = *a great deal of this feeling*. Discrete emotions were measured as follows: Sympathy: affectionate, sympathetic, tender, compassionate, and warmhearted ($\alpha = .89$); Happiness: cheerful, happy, and content ($\alpha = .83$); Disgust: disgusted, sickened and revolted ($\alpha = .86$); Fear: fearful, afraid, and scare ($\alpha = .95$); Anger: irritated, angry, annoyed and aggravated ($\alpha = .92$); Surprise: surprised, startled, and astonished ($\alpha = .90$); Shame: embarrassed, responsible, guilty, and shamed ($\alpha = .80$). Sub-scales for all the discrete emotions were reliable. Therefore, seven new variables representing these seven discrete emotions were created by calculating means of measures included in each sub-scale.

**Attitudes.** Participants were asked on 7-point Likert scales about their attitudes towards maintaining sufficient sleep, where 0 = *strongly disagree* and 6 = *strongly agree*. The measures
included “I agree that it is critical to maintain sufficient sleep”, “I agree that I should not sacrifice the amount of sleep to get other things done”, and “I agree that the sufficient sleep can help me be less stressed”. The three-item scale was reliable ($\alpha = .73$). Therefore, an overall mean was calculated for each person.

**Behavioral intentions.** Fifteen measures in three sub-categories of behavioral intentions were used in this study. The three sub-categories included general behavioral intention of maintaining sufficient sleep, behavioral intentions towards specific sleep strategies suggested by the main message of the online health support group, and behavioral intentions towards specific sleep strategies suggested by reply messages of the online health support group. They were divided because participants in different conditions (such as treatment vs. control or emotional/non-emotional support vs. non-support conditions) were exposed to different sets of strategies depending on the messages they were required to read.

**General behavior intention.** Two measures of general behavioral intention to maintain sufficient sleep were employed: “I will try my best to maintain sufficient amount for sleep regularly even when I am stressed about life” and “I won’t sacrifice my sleep to deal with my stress”. Participants were asked to respond on 7-point Likert scales whether they agree with these statements or not where 0 = *strongly disagree* and 6 = *strongly agree*. These two measures were strongly correlated ($r = .57, p < .001, \alpha = .72$). Therefore, an overall mean was calculated for each person.

**Behavioral intentions towards sleep strategies suggested by the main message.** Ten measures testing behavioral intentions towards sleep strategies suggested by the main message were used. Sample measures included: “I will keep my bedroom dark”, “I won’t drink coffee, tea or other beverage that contains caffeine close to bedtime”, and “I won’t watch television in my bedroom”. Participants were asked to respond on 7-point Likert scales whether they agree with these statements
or not where 0 = strongly disagree and 6 = strongly agree. The ten-item scale was reliable (α = .80). Therefore, an overall mean was calculated for each person.

**Behavioral intentions towards sleep strategies suggested by reply messages.** Three measures testing behavioral intentions towards strategies suggested by reply messages were employed: “I will go to bed early at night”, “I will get up early in the morning” and “I will go to bed and get up around same time everyday”. Participants were asked to respond on 7-point Likert scales whether they agree with these statements or not where 0 = strongly disagree and 6 = strongly agree. The three-item scale was reliable (α = .74). Therefore, an overall mean was calculated for each person.

**Identification.** Nine items were used to examine participant’s identification with people who experienced stress and wrote on the online health support group. The items modified Cohen’s identification scale (Cohen, 2001). Sample measures included “While reading the messages, I felt as if I was part of the action”, “I tend to understand the reasons why the post authors do what they do” and “When the post authors succeed, I felt joy, but when they failed, I was sad”. Participants were asked to respond on 7-point Likert scales whether the statement represented their experience where 0 = not at all and 6 = very much. The nine-item scale was reliable (α = .90). Therefore, an overall mean was calculated for each person.

**Transportation.** Twelve items were used to examine participant’s transportation experience during reading the main message. The scale was developed by Green and Brock (2000). Sample measures included “While I was reading the narrative, I could easily picture the events in it taking place”, “While I was reading the narrative, activity going on in the room around me was on my mind” (reverse coded), “The events in the narrative have changed my life” and so forth. Participants were asked to respond on 7-point Likert scales whether the statement represented their experience
where 0 = not at all and 6 = very much. The twelve-item scale was reliable (\(\alpha = .81\)). Therefore, an overall mean was calculated for each person.

**Relational motivations of Internet Use.** Two measures on relational motivations of Internet use were used to examine whether participants tend to be open and disclose themselves when using the Internet. The two measures included “I don’t expect I will become good friend with people I know from the cyber space” (reverse coded) and “I seek for personal and meaningful communication with other people online”. Participants were asked to respond on 7-point Likert scales whether they agree with these statements or not where 0 = *strongly disagree* and 6 = *strongly agree*. The two items were moderately correlated with each other (\(r = .36, p < .001, \alpha = .53\)). Therefore, the two items were separately used in further analyses.

**Online support group use.** Two questions were asked to investigate how comfortable people feel to use online support group. First, participants were asked “Have you participated in online support group in the past” using a 7-point Likert scale where 0 = *never* and 6 = *very often*. Second, participants were asked “How likely would you personally seek out online support group” using a 7-point Likert scale where 0 = *not likely at all* and 6 = *very likely*. The two items were strongly correlated with each other (\(r = .61, p < .001, \alpha = .75\)). Therefore, one variable was created by calculating the means of individual responses to these two items.

**Involvement.** Three questions were asked to examine how much the participants could get involved in the health scenario constructed by the experimental stimuli by checking how much stress and sleep problems these participants experienced. Using 7-point Likert scales, the measures were as follows: “How often do you experience stress in your daily life?” (0 = *never* and 6 = *very often*), “Please describe your stress lately” (0 = *not at all* and 6 = *very much*) and “How often do you experience sleep problems (i.e., lack of sleep, irregular sleep cycle) in your daily life?” (0 = *never* and 6 = *very much*). The two items for stress were strongly correlated (\(r = .69, p < .001, \alpha = .81\)).
Therefore, one variable was created by calculating the means of the individual responses to these two items. The third item was individually used as a measure of personal involvement in sleep problems.

**Demographic information.** Participants were asked about their gender, age, class standing in their academic career and race at the end of the questionnaire. Specific wordings of questions and measures are presented in Appendix C.

**Personal narratives.** After participants read the experimental stimulus and were required to respond to measures of manipulation checks and environmental perceptions, participants were instructed to form personal narratives about college stress. In treatment conditions, participants were asked to write a reply message to the messages that they just read. In the control condition where participants were not exposed to any message, they were asked to imagine they encountered a health support group about college stress when they browse the Internet and were asked to write a message to share with other users in the group. A content analysis was conducted on these personal narratives to investigate how participants disclosed their own experience, how they expressed their feelings, what cognitions they underwent to solve their problems and what solutions they found at the end. Intercoder reliabilities were calculated on fifty three personal narratives randomly selected and coded by two trained coders. The SPSS macro developed by Hayes and Krippendorff (2007) for calculating Krippendorff’s alpha was used to calculate intercoder reliabilities. Krippendorff’s alpha was selected as it could be applied to data coded by two coders with any level of measurement (Hayes & Krippendorff, 2007).

As defined in the narrative processes model, three different modes of narrative could be distinctly identified in personal narratives. They are articulation, elaboration and transformation modes (Angus & hardtke, 1994; Angus, Lewin & Hardtke, 1996; Angus, Levitt & Hardtke, 1999; Angus, Lewin, Bouffard & Rotodi-Trevisan, 2004). The content analysis examined all these three elements of personal narratives. To examine articulation of one’s own experience, *level of*
identification that participants expressed in personal narratives with people who disclosed their stories and concerns before in the online health support group was coded at three levels: 0 = no identification at all, 1 = identification without disclosing personal experience, and 2 = identification with personal experience disclosed (Krippendorff’s α = .76). Second, the number of self-qualities contained in the personal narratives was coded. Self-qualities refer to statements containing all types of personal information; no matter it is biographical information or deeply intimate information. For example, some participants disclosed the following information in their personal narratives: “I often feel like I have a long ’to-do’ list for each day”, or “Being an engineering major I am under stress all the time from the mass amounts of work that are required”. The higher number of self-qualities disclosed in a personal narrative, the more information about self was disclosed. Therefore, the number of self-qualities disclosed in each personal narrative was an indicator of the amount of self-disclosure (Krippendorff’s α = .86). Third, intimacy of self-disclosure was coded by asking coders to evaluate on a 5-point Likert scale from 0 to 4 where 0 = not vulnerable at all and 4 = extremely vulnerable how vulnerable the participant would be after disclosing such information (Krippendorff’s α = .96). The measure was created by modifying existing measures developed by Joinson (2001a).

To examine how people expressed their emotions, the coders were first asked to draw a line graph depicting the changes of the author’s emotional changes during writing the personal narrative. When the line went up, it showed that the author became more positive; and when the line went down, it showed that the author became more negative. This measure followed Gergen and Gergen’s (1997) theory about progressive and regressive narratives. They described that the progressive narrative represents narrative character’s increment path while the regressive narrative represents narrative character’s decrement path. Second, the coders were asked to count the number of times when the narrative went up (Krippendorff’s α = .89) and the number of times when the narrative
went down (Krippendorff’s $\alpha = .78$). Third, the coders were also asked to code the position of the ending point of the narrative compared with the starting point. Five categories were developed: 0 = lowest point of the narrative, 1 = middle point but lower than the starting point, 2 = middle point but higher than the starting point, 3 = middle point but similar with the starting point, and 4 = highest point of the narrative (Krippendorff’s $\alpha = .77$).

Transformation mode of narrative was examined by looking at what cognitions participants went through and what solutions and strategies they found to deal with their experienced stress. First, the number of pro-message thoughts and the variety of pro-message thoughts contained in each personal narrative were coded. Pro-message cognition coding schemes were developed based on experimental stimuli. Overall, eleven categories of pro-message cognitions were included: prominence of college stress problem; prominence of sleep problems among college students; health consequences of stress and sleep problems; consequences of the lack of sleep on academic activities; negative attitudes towards sacrificing amount of sleep; positive attitudes towards maintaining sufficient sleep; references to sleep strategies suggested by the main message; references to sleep strategies suggested by the reply messages; the choice of healthy lifestyle to deal with college stress; and positive evaluations of experimental stimuli. Coding schemes in exact wordings are presented in Appendix D. Thoughts were defined as independent semantic meanings separated by punctuations or conjunctions. The number of pro-message thoughts was coded by adding the number of thoughts fallen into each of the eleven categories (Krippendorff’s $\alpha = .91$). The variety of pro-message thoughts were coded by counting the number of categories that pro-message thoughts contained by each personal narrative had fell into (Krippendorff’s $\alpha = .89$). Second, coding schemes for counter-message cognitions were developed based on experimental stimuli. The schemes included denial of college stress and sleep problems among college students; considering sleep problems less serious; considering college stress uncontrollable; considering sleep problems uncontrollable; considering
sleep to be ineffective to deal with college stress; and negative evaluations of the experimental stimuli. Coding schemes in exact wordings are presented in Appendix D. The amount of counter-message thoughts (Krippendorff’s α = .73) and the variety of counter-message thoughts (Krippendorff’s α = .73) were coded as how pro-message cognitions were coded. Third, solutions proposed in each personal narrative to deal with college stress were coded. A variety of strategies related to sleep that have been suggested by experimental messages were listed as coding schemes, including “Don’t have a big meal before going to bed”, “Don’t consume caffeine such as coffee, tea, soft drinks, and chocolate close to bedtime”, “Don’t consume nicotine including cigarettes or tobacco products close to bedtime”, “Don’t watch television, and engage in stimulating activity in the bedroom”, “Maintain regular bedtime routines”, “Adjust biological clock back to normal”, and “Other strategies about maintaining sufficient and quality sleep”. Coders were asked to code whether strategies proposed in each personal narrative fell into any of above mentioned categories. Then, the number of categories in which the sleep-related strategies fell was counted (Krippendorff’s α = .92).

Besides sleep related strategies, participants also mentioned time management, mood management, eating, physical exercise and recreational activities frequently as ways to deal with stress. These strategies were coded and the variety of non-sleep strategies mentioned in each personal narrative were added together (Krippendorff’s α = .79).

The frame used by each personal narrative was coded. Six frames were examined: the reconstruction frame, the internalization frame, the suffering frame, the support frame, the message evaluations frame, and other. As different frames promote unique problem definition, causal interpretation and solution (Entman, 1993), the frame of personal narratives was mutually exclusively coded across these six categories. Personal narrative using the reconstruction frame start with the authors’ own stressful experiences. Although they began with descriptions of a negative experience, with the development of the narratives, the authors always found new meanings of the
disturbing experience and found solutions to deal with stress. In other words, participants who used the reconstruction frame to construct their written responses tended to actively think their problems and solve the problems at the end. Personal narratives guided by the internalization frame, on the other hand, viewed college stress as a normal part of daily life, which indicated that participants who used this frame to construct their written responses tended to passively rather than actively think stress. Participants who used the suffering frame to form their personal narratives complained about their stressful experiences without seeking any solutions. They disclosed their negative feelings associated with their stressful experiences. Personal narratives using the support frame focused on showing understanding to other people who suffered from college stress and trying to provide suggestions to deal with the stress. However, they did not disclose their own experiences and feelings. Personal narratives using the message evaluations frame commented on experimental stimuli. Authors of these narratives mostly expressed negative evaluations towards the stimuli such as denying sleep as an effective strategy to deal with stress or challenging the meanings of the stimuli that participants were asked to read. Personal narratives that did not use any frame mentioned above were coded as other (Krippendorff’s α = .91).

To examine shifts between narrative modes in each personal narrative, the narrative mode for each sentence was coded. **Articulation mode** referred to descriptions of the participant’s experience, which could easily be externally observed (Krippendorff’s α = .87). **Elaboration mode** referred to descriptions of internal thoughts and subjective feelings that the participant experienced, which, contrary to experience, was unobserved and could only be disclosed by the participant himself/herself (Krippendorff’s α = .78). **Transformation mode** referred to descriptions of new meanings that the participant found after re-organizing his/her experience and feelings (Krippendorff’s α = .84). The number of sentences using each narrative mode in each participant’s narrative was counted. Six types of **shifts between narrative modes** were calculated, including shifts
from articulation to elaboration, shifts from articulation to transformation, shifts from elaboration to articulation, shifts from elaboration to transformation, shifts from transformation to articulation, and shifts from transformation to elaboration. Specific wording for each coding scheme is presented in Appendix D.

Analyses

ANOVA were performed to examine the impact of narrative exposure, social support, and their interaction on environmental perceptions, including perceived emotion support, perceived information support, perceived vulnerability and perceived security concern. The same statistical analyses were performed on interval/ratio level of measures of personal narratives, such as the number of self-qualities, emotional rises and falls, the amount and the variety of pro-message thoughts, the amount and the variety of counter-message thoughts, the number of sleep-related strategies suggested referred to deal with stress, the number of sentences using each narrative mode and shifts between narrative modes. Chi-square analyses were performed to examine the effects of narrative exposure and social support on frames that participants chose to use to organize their personal narratives. ANOVAs and regression analyses were also conducted to examine the effects of narrative exposure, level of support, and frames of personal narratives on attitudes, emotional responses, and intentions to perform suggested behaviors. Bootstrapping mediation tests and group analyses were used to examine the mediating roles of identification, transportation, and sympathy in suggested model proposed in this study.

Methodological limitations and future studies

This dissertation employed a single health topic design. In other words, this study explored the effects of personal stories and supportive messages in an online health support group about college stress. To examine the persuasion effects of narrative messages and supportive messages and,
in turn, to explore the value of online health support group use for helping people organize their health experiences, a multiple health topics design could have been employed to expand the findings. By focusing on a variety of health topics, the findings could then be used to study the effects of online health support groups to manage health experiences for many diseases rather than only college stress. It is important to note that theoretically, the proposed health persuasion outcomes of individuals’ exposure to narrative and supportive messages should work for any health issue. However, online health support groups may not be able to demonstrate their advantages when they are used to manage short-term and common illnesses, such as a seasonal flu infection. This issue arises because people may not feel they have an uncommon enough sickness/disease to warrant communication using this particular medium. As such, diseases associated with certain levels of social stigma and those that must be chronically combated might be more worthy to investigate in future studies on online health support groups.

Another limitation of this study is the use of a student sample. Although this study presented a health issue that college students may easily relate to, a non-student sample may demonstrate stronger involvement with the use of online health support groups and may respond to messages in these groups differently. Previous studies have suggested that people diagnosed with chronic diseases and stigmatized illnesses may participate in online health support groups regularly (Davison, Pennebaker & Dickerson, 2000). Regular users of online health support groups, rather than hypothetical first-time users represented by the college students in this study, may demonstrate higher sensitivity to messages in online health support groups due to their health experiences. Consequently, they may demonstrate greater emotional and cognitive changes by interacting with other users. Future studies using actual online health support group users are warranted.
Chapter 4

Results

Effects of narrative exposure

Hypothesis 1 proposed that participants in narrative conditions would generate fewer counter-arguments than participants in non-narrative conditions. To test this hypothesis, two independent t-tests were performed to examine the effects of narrative exposure on the amount and the variety of counter-arguments disclosed in personal narratives respectively. The results revealed that participants in narrative conditions ($M = .14, SD = .57$) generated significantly fewer amount of counter-arguments in personal narratives than participants in non-narrative conditions ($M = .69, SD = 1.35$), $t(119.24) = 3.51, p < .01$. The independent t-test on the variety of counter-arguments generated in personal narratives showed the same pattern. Participants in narrative conditions ($M = .08, SD = .31$) generated significantly fewer variety of counter-arguments than participants in non-narrative conditions ($M = .37, SD = .57$), $t(137.11) = 4.19, p < .001$. Therefore, hypothesis 1 was supported.

Hypothesis 2 addressed that narrative exposure would produce greater emotional responses such as sympathy than non-narrative exposure. The result of an independent t-test revealed that participants in narrative conditions ($M = 2.93, SD = 1.31$) reported significantly greater sympathy after reading the messages than participants in non-narrative conditions ($M = 2.25, SD = 1.61$), $t(196.98) = -3.34, p < .01$. The t-tests showed that all other emotions including fear, anger, sadness, happiness, surprise and disgust did not vary as a function of narrative exposure. Hypothesis 2 was partially supported.

Hypothesis 3 proposed that participants in narrative conditions would like to generate more interpersonal discussion than participants in non-narrative conditions. In the current study,
interpersonal discussion was represented by writing responses to participate in the existing discussion in the online health support group. To test this hypothesis, two statistical analyses were performed. First, a cross-tabulation chi-square analysis was conducted on whether or not participants wrote a personal narrative. The result of the analysis revealed that participants in narrative and non-narrative conditions did not demonstrate significant difference in their willingness to write a response, $\chi^2(1, N=219) = 1.05, p = .31, V^* = .07$. Second, an independent t-test was performed on the length of personal narratives written by participants. The result of the t-test again showed no statistical difference between the length of personal narratives written by participants in narrative and non-narrative conditions, $t(174) = -.36, p = .72$. Therefore, hypothesis 3 was not supported.

Hypothesis 4 proposed that narrative exposure leads to positive persuasion outcomes, including fewer counter-arguments, greater emotional responses, greater willingness of online health support group participation, greater attitudes, and greater behavioral intentions, mediated by identification and transportation. To test these hypotheses, bootstrapping mediation procedures using 2000 bootstrap samples and bias-corrected confidence intervals were employed, where narrative exposure was used as the independent variable, identification and transportation as the mediating variable respectively, and persuasion outcomes mentioned before as the dependent variables respectively. The tests suggested there were no significant indirect effects of narrative exposure and persuasion outcomes via identification. The results revealed that narrative exposure did not lead to significantly greater identification ($\beta = .08, p = .60$). Since the mediating role of identification was theoretically applied to narrative exposure rather than non-narrative exposure, it was highly possible that greater identification was associated with greater persuasion outcome in the narrative group only. Therefore, group analyses were performed within the narrative group and the non-narrative group respectively. Table 2 summarizes the results. Generally, the results showed that regression weights were larger in narrative conditions than in non-narrative conditions. Also, identification
significantly predicted general behavioral intentions in narrative conditions but not in non-narrative conditions. However, when the relationships between identification and persuasion outcomes were compared, the results showed that all of these relationships were statically identical between the narrative group and the non-narrative group (the amount of counter-arguments: $\chi^2 = .07$, df = 1, $p = .79$, RMSEA = .00, 90% CI: .00 - .13, CFI = 1.00; the variety of counter-arguments: $\chi^2 = .06$, df = 1, $p = .82$, RMSEA = .00, 90% CI: .00 - .12, CFI = 1.00; sympathy: $\chi^2 = .08$, df = 1, $p = .77$, RMSEA = .00, 90% CI: .00 - .12, CFI = 1.00; length of the written response: $\chi^2 = .02$, df = 1, $p = .89$, RMSEA = .00, 90% CI: .00 - .12, CFI = 1.00; attitudes: $\chi^2 = .00$, df = 1, $p = .95$, RMSEA = .00, 90% CI: .00 - .00, CFI = 1.00; general behavioral intention: $\chi^2 = .79$, df = 1, $p = .38$, RMSEA = .00, 90% CI: .00 - .17, CFI = 1.00; behavioral intentions to perform sleep strategies suggested by the main message: $\chi^2 = .03$, df = 1, $p = .87$, RMSEA = .00, 90% CI: .00 - .09, CFI = 1.00; and behavioral intentions to perform sleep strategies suggested by reply messages: $\chi^2 = .78$, df = 1, $p = .38$, RMSEA = .00, 90% CI: .00 - .17, CFI = 1.00).

Transportation was not found to mediate the narrative exposure and persuasion outcomes either. First, bootstrapping mediation test suggested that the relationship between narrative exposure and transportation was not significant ($\beta = -.04$, $p = .74$). Second, group analyses were conducted to examine whether the relationships between transportation and persuasion outcomes were significantly different between the narrative group and the non-narrative group. The model comparison statistics suggested that there was no significant difference between the narrative group and the non-narrative group (the amount of counter-arguments: $\chi^2 = 1.64$, df = 1, $p = .20$, RMSEA = .06, 90% CI: .00 - .22, CFI = .00; the variety of counter-arguments: $\chi^2 = .27$, df = 1, $p = .61$, RMSEA = .00, 90% CI: .00 - .16, CFI = 1.00; sympathy: $\chi^2 = 1.19$, df = 1, $p = .28$, RMSEA = .03, 90% CI: .00 - .19, CFI = 1.00; the length of the written response: $\chi^2 = .03$, df = 1, $p = .86$, RMSEA = .00, 90% CI: .00 - .11, CFI = 1.00; attitudes: $\chi^2 = .29$, df = 1, $p = .59$, RMSEA = .00, 90% CI: .00 - .15; general
behavioral intention: $\chi^2 = .43$, df = 1, $p = .51$, RMSEA = .00, 90% CI: .00 - .16; behavioral intentions to perform sleep strategies suggested by the main message: $\chi^2 = .48$, df = 1, $p = .49$, RMSEA = .00, 90% CI = .00 - .16, CFI = 1.00; and behavioral intentions to perform sleep strategies suggested by reply messages: $\chi^2 = 2.32$, df = 1, $p = .13$, RMSEA = .08, 90% CI = .00 - .22, CFI = .94). Therefore, hypothesis 4 was not supported.

Table 2. Regression of persuasion outcomes on identification in narrative versus non-narrative conditions.

<table>
<thead>
<tr>
<th>Identification</th>
<th>Narrative β</th>
<th>Non-narrative β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification---&gt; The amount of counter-arguments</td>
<td>-0.20 †</td>
<td>-0.15</td>
</tr>
<tr>
<td>Identification---&gt; The variety of counter-arguments</td>
<td>-0.25 *</td>
<td>-0.13</td>
</tr>
<tr>
<td>Identification---&gt; Sympathy</td>
<td>0.57 ***</td>
<td>0.55 ***</td>
</tr>
<tr>
<td>Identification---&gt; The length of the written response</td>
<td>0.33 **</td>
<td>0.19 †</td>
</tr>
<tr>
<td>Identification---&gt; Attitudes</td>
<td>0.12</td>
<td>0.11</td>
</tr>
<tr>
<td>Identification---&gt; General behavioral intention</td>
<td>0.23 *</td>
<td>0.12</td>
</tr>
<tr>
<td>Identification---&gt; Intentions to perform sleep strategies suggested by the main message</td>
<td>0.35 ***</td>
<td>0.35 ***</td>
</tr>
<tr>
<td>Identification---&gt; Intentions to perform sleep strategies suggested by the reply messages</td>
<td>0.31 ***</td>
<td>0.28 **</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transportation</th>
<th>Narrative β</th>
<th>Non-narrative β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transportation---&gt; The amount of counter-arguments</td>
<td>0.04</td>
<td>-0.13</td>
</tr>
<tr>
<td>Transportation---&gt; The variety of counter-arguments</td>
<td>-0.12</td>
<td>-0.13</td>
</tr>
<tr>
<td>Transportation---&gt; Sympathy</td>
<td>0.50 ***</td>
<td>0.50 ***</td>
</tr>
<tr>
<td>Transportation---&gt; The length of the written response</td>
<td>-0.11</td>
<td>-0.05</td>
</tr>
<tr>
<td>Transportation---&gt; Attitudes</td>
<td>0.01</td>
<td>0.08</td>
</tr>
<tr>
<td>Transportation---&gt; General behavioral intention</td>
<td>0.13</td>
<td>0.03</td>
</tr>
<tr>
<td>Transportation---&gt; Intentions to perform sleep strategies suggested by the main message</td>
<td>0.28 **</td>
<td>0.34 ***</td>
</tr>
<tr>
<td>Transportation---&gt; Intentions to perform sleep strategies suggested by the reply messages</td>
<td>0.38 ***</td>
<td>0.22 *</td>
</tr>
</tbody>
</table>

Note: *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$.

**Comparisons to the control group.** In order to examine the effects of narrative exposure, several one-way ANOVAs were performed to compare persuasion outcomes in narrative, non-narrative and control conditions. Table 3 summarizes the results. Although previous analyses revealed that narrative exposure, compared with non-narrative exposure, led to fewer counter-
arguments, Holm’s sequential bonferroni post hoc test revealed no significant difference on the amount and the variety of counter-arguments generated by participants between the narrative conditions and the control group. In other words, narrative exposure was not found to reduce counter-arguments. Rather, non-narrative messages were found to significantly generate counter-arguments (see Table 3 for means and standard errors).

Table 3. Means and standard error scores for counter-arguments, emotional responses, attitudes, and behavioral intentions by conditions.

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Narrative</th>
<th>Non-narrative</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of counter-arguments</td>
<td>0.14&lt;sub&gt;a&lt;/sub&gt;</td>
<td>0.69&lt;sub&gt;b&lt;/sub&gt;</td>
<td>0.17&lt;sub&gt;a&lt;/sub&gt; **</td>
</tr>
<tr>
<td></td>
<td>(0.06)</td>
<td>(0.14)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Variety of counter-arguments</td>
<td>0.08&lt;sub&gt;a&lt;/sub&gt;</td>
<td>0.37&lt;sub&gt;b&lt;/sub&gt;</td>
<td>0.13&lt;sub&gt;a&lt;/sub&gt; ***</td>
</tr>
<tr>
<td></td>
<td>(0.03)</td>
<td>(0.06)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>Sympathy</td>
<td>2.92&lt;sub&gt;a&lt;/sub&gt;</td>
<td>2.25&lt;sub&gt;b&lt;/sub&gt;</td>
<td>2.13&lt;sub&gt;b&lt;/sub&gt; **</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.16)</td>
<td>(0.28)</td>
</tr>
<tr>
<td>Happiness</td>
<td>2.15&lt;sub&gt;a&lt;/sub&gt;</td>
<td>2.01&lt;sub&gt;a&lt;/sub&gt;</td>
<td>2.92&lt;sub&gt;b&lt;/sub&gt; *</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.14)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>Disgust</td>
<td>1.01</td>
<td>1.03</td>
<td>1.04</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.12)</td>
<td>(0.22)</td>
</tr>
<tr>
<td>Surprise</td>
<td>1.14</td>
<td>1.18</td>
<td>0.86</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.14)</td>
<td>(0.22)</td>
</tr>
<tr>
<td>Fear</td>
<td>1.07</td>
<td>1.17</td>
<td>1.60</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.14)</td>
<td>(0.34)</td>
</tr>
<tr>
<td>Sadness</td>
<td>1.38</td>
<td>1.27</td>
<td>1.42</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.14)</td>
<td>(0.29)</td>
</tr>
<tr>
<td>Anger</td>
<td>1.25</td>
<td>1.51</td>
<td>1.78</td>
</tr>
<tr>
<td></td>
<td>(0.13)</td>
<td>(0.15)</td>
<td>(0.09)</td>
</tr>
<tr>
<td>Shame</td>
<td>1.31</td>
<td>1.30</td>
<td>1.63</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.12)</td>
<td>(0.19)</td>
</tr>
<tr>
<td>Attitudes</td>
<td>4.55</td>
<td>4.41</td>
<td>4.32</td>
</tr>
<tr>
<td></td>
<td>(0.11)</td>
<td>(0.12)</td>
<td>(0.21)</td>
</tr>
<tr>
<td>General behavioral intention</td>
<td>4.05</td>
<td>3.93</td>
<td>3.95</td>
</tr>
<tr>
<td></td>
<td>(0.12)</td>
<td>(0.14)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Intentions to perform suggested sleep</td>
<td>3.82</td>
<td>3.81</td>
<td>3.44</td>
</tr>
<tr>
<td>strategies suggested by the main message</td>
<td>(0.10)</td>
<td>(0.11)</td>
<td>(0.21)</td>
</tr>
</tbody>
</table>

Notes: Means are reported first followed by standard error scores in parentheses. Using Holm’s sequential bonferroni post hoc comparisons, within rows, means with no lower case subscript in common differ at p < .05.
The analyses also revealed that participants in narrative conditions reported significantly greater sympathy than participants in non-narrative conditions and the control group, $F(2, 241) = 6.95, p < .01$. Participants in both narrative and non-narrative conditions reported significantly less happiness than participants in the control group, $F(2, 239) = 4.64, p < .05$. These results continue to suggest the effectiveness of narrative messages on stimulating emotional responses. No statistical significance was found on attitudes, general behavioral intention and behavioral intentions to perform sleep strategies suggested by the main message either between the narrative group and the control group or between the non-narrative group and the control group.

**Effects of social support**

Hypothesis 5 proposed a main effect of social support on perceived supportiveness of the online health support group. Perceived emotional support and perceived informational support were separately examined. A one-way ANOVA performed on perceived emotional support across treatment conditions suggested that the observed social support made a significant difference on self-reported perceived emotional support, $F(2, 207) = 3.43, p < .05$. The participants in emotional support conditions ($M = 3.38, SD = 1.35$) reported the highest perceived emotional support, followed by the participants in non-emotional support conditions ($M = 3.02, SD = 1.35$) and then the participants in non-support conditions ($M = 2.83, SD = 1.17$). However, Holm’s sequential bonferroni post hoc tests suggested that the statistical difference occurred in the emotional support and non-support comparison rather than the emotional support and non-emotional support comparison. The second one-way ANOVA was performed on perceived informational support. The analysis revealed no statistical significance on perceived informational support across conditions, $F(2, 208) = 1.04, p = .36$. Therefore, hypothesis 5 was partially supported.
Interaction effects of narrative exposure and social support

Hypothesis 6 proposed an interaction effect of narrative exposure and social support on perceived emotional support. Specifically, the greatest perceived emotional support should be reported in the narrative and emotional support condition while the lowest perceived emotional support should be reported in the narrative and non-emotional support condition. A 2 (narrative exposure) X 3 (social support) analysis of variance was conducted on perceived emotional support. The analysis revealed a main effect of social support on perceived emotional support, \( F(1, 204) = 3.90, p < .05, \text{partial } \eta^2 = .04 \). Holm’s sequential bonferroni post hoc comparisons showed that participants reported significantly higher perceived emotional support in emotional support conditions \( (M = 3.39, SE = .15) \) than non-support conditions \( (M = 2.80, SE = .15) \). This finding has been revealed in the statistical test for hypothesis 5. An interaction effect found on perceived emotional support was only approaching statistical significance, \( F(2, 204) = 2.38, p = .10, \text{partial } \eta^2 = .02 \). Observed social support did not significantly vary participants’ perceptions of emotional support after narrative exposure. However, after exposure to the non-narrative message, the higher social support the participants observed in the online health support group, the greater perceived emotional support they reported. The means associated with the interaction effect are presented in Table 4. Hypothesis 6 was partially supported.

Table 4. Means and standard errors of perceived emotional support across conditions.

<table>
<thead>
<tr>
<th></th>
<th>Emotional support</th>
<th>Non-emotional support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Narrative</strong></td>
<td>( M )</td>
<td>( M )</td>
</tr>
<tr>
<td>( M )</td>
<td>3.29\text{\textsubscript{aA}}</td>
<td>3.28\text{\textsubscript{bA}}</td>
</tr>
<tr>
<td>( SE )</td>
<td>(0.21)</td>
<td>(0.21)</td>
</tr>
<tr>
<td><strong>Non-narrative</strong></td>
<td>( M )</td>
<td>( M )</td>
</tr>
<tr>
<td>( M )</td>
<td>3.50\text{\textsubscript{aA}}</td>
<td>3.17\text{\textsubscript{bA}}</td>
</tr>
<tr>
<td>( SE )</td>
<td>(0.23)</td>
<td>(0.20)</td>
</tr>
</tbody>
</table>

\( F(2, 204) = 2.38, p = .10, \text{partial } \eta^2 = .02 \).

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, means with no lower case subscript in common differ at \( p < .05 \); within columns, means with no upper case subscript in common differ at \( p < .05 \).
Factorial ANOVAs were also performed on persuasion outcomes such as the number and the variety of counter-arguments, emotional responses, attitudes and behavioral intentions. Narrative exposure and social support explained a significant proportion of the variance of sympathy but not of other variables. The analysis revealed a main effect of narrative exposure, $F(1, 208) = 13.86, p < .001$, partial $\eta^2 = .06$. Participants in narrative conditions ($M = 2.94, SE = .13$) reported significantly greater sympathy than participants in non-narrative conditions ($M = 2.23, SE = .14$). This finding has been revealed in the statistical test for hypothesis 2. In addition, the analysis revealed a main effect of social support, $F(2, 208) = 11.88, p < .001$, partial $\eta^2 = .10$. Participants who observed emotional support ($M = 3.06, SE = .17$) and non-emotional support ($M = 2.75, SE = .16$) reported significantly greater sympathy than participants who observed no support ($M = 1.95, SE = .17$). In addition, an interaction effect of narrative exposure and social support was found on sympathy, $F(2, 208) = 5.74, p < .01$, partial $\eta^2 = .05$. Table 5 summarizes the means associated with the interaction. The results illustrated that the level of social support observed by participants did not influence their reported sympathy when they read a narrative message discussing college stress. In contrast, social support made a difference on reported sympathy among the participants who read a non-narrative message.
Among participants who read a non-narrative message, the exposure to high level supportive message was related to greater reported sympathy.

Table 5. Means and standard errors of sympathy across conditions.

<table>
<thead>
<tr>
<th></th>
<th>Emotional Support</th>
<th>Non-emotional Support</th>
<th>Non-support</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Narrative</strong></td>
<td>$M$</td>
<td>$2.97_{\text{aA}}$</td>
<td>$3.19_{\text{aA}}$</td>
</tr>
<tr>
<td></td>
<td>$SE$</td>
<td>$(0.23)$</td>
<td>$(0.23)$</td>
</tr>
<tr>
<td><strong>Non-Narrative</strong></td>
<td>$M$</td>
<td>$3.14_{\text{bA}}$</td>
<td>$2.31_{\text{bB}}$</td>
</tr>
<tr>
<td></td>
<td>$SE$</td>
<td>$(0.25)$</td>
<td>$(0.21)$</td>
</tr>
</tbody>
</table>

$F(2, 208) = 5.74$, $p < .01$, partial $\eta^2 = .05$.

*Note:* Using Holm’s sequential bonferroni post hoc comparisons, within rows, means with no lower case subscript in common differ at $p < .05$; within columns, means with no upper case subscript in common differ at $p < .05$.

Figure 6. Interaction effect of narrative exposure and social support on sympathy.

**Personal narratives as engagement in supportive interactions**

Voluntary engagement. Research question 2 asked how observed supportive interactions, including whether or not participants read a narrative story revealing college stress and how much support other users of the online health support group provided, influenced their engagement in supportive interactions. First of all, whether participants voluntarily generated personal narratives to
participate in the online health support group was examined. Most of the participants voluntarily
wrote a response to participate ($N = 206, 82.73\%$). Below are the descriptive statistics of
participants’ narratives across different conditions. Whether or not participants wrote a response did
not vary as a function of neither narrative exposure, $\chi^2(1, N = 219) = 1.05, p = .31$, nor social support
$=, \chi^2(2, N = 219) = 2.50, p = .29$. The length of their narrative did not vary as a function of narrative
exposure, $F(1, 170) = .14, p = .71$, partial $\eta^2 = .00$, social support, $F(2, 170) = .01, p = .99$, partial $\eta^2$
$= .00$, or the interaction of these two factors either, $F(2, 170) = .27, p = .77$, partial $\eta^2 = .00$.
Furthermore, attributes of personal narratives were analyzed.

### Table 6. Descriptive statistics of participants’ narratives of college stress.

<table>
<thead>
<tr>
<th></th>
<th>Frequency</th>
<th>Length</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$N$</td>
<td>Percentage</td>
</tr>
<tr>
<td>Narrative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional support</td>
<td>27</td>
<td>75.00%</td>
</tr>
<tr>
<td>Non-emotional support</td>
<td>28</td>
<td>77.80%</td>
</tr>
<tr>
<td>Non-support</td>
<td>32</td>
<td>80.00%</td>
</tr>
<tr>
<td>Non-narrative</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional support</td>
<td>25</td>
<td>75.80%</td>
</tr>
<tr>
<td>Non-emotional support</td>
<td>35</td>
<td>81.40%</td>
</tr>
<tr>
<td>Non-support</td>
<td>29</td>
<td>93.50%</td>
</tr>
<tr>
<td>Control</td>
<td>30</td>
<td>100.00%</td>
</tr>
</tbody>
</table>

**The number of personal qualities.** A 2 (narrative exposure) X 3 (social support) analysis of
variance was performed on the amount of personal qualities disclosed in participant’s narrative. As
argued in the methodology chapter, the number of personal qualities disclosed in participants’
narratives indicated amount of self-disclosure. A main effect of social support was found on the
number of personal qualities disclosed, $F(2, 170) = 3.12, p < .05$, partial $\eta^2 = .04$. Participants in non-
support conditions significantly disclosed more personal qualities ($M = 2.82, SE = .43$) than
participants in non-emotional support conditions ($M = 1.49, SE = .39$).

**Intimacy of self-disclosure.** An analysis of variance was performed on intimacy of self-
disclosure. The analysis revealed no significant main effect of narrative exposure, $F(1, 170) = 1.70, p$
The interaction of the two factors did not lead to statistical difference either, $F(2, 170) = .31, p = .73$, partial $\eta^2 = .00$.

**Stress identification.** Cross-tabulation chi-square analyses were performed to examine whether participants identified with the authors of previous messages on college stress experience. As stated before, three levels of identification were coded in the current study: no identification, identification without disclosing personal experience and identification with disclosing personal experience. A 2X3 chi-square analysis revealed no impact of narrative exposure on stress identification disclosed in participants’ narratives, $\chi^2(2, N=176) = 4.52, p = .10, V^* = .16$. A 3X3 chi-square analysis revealed that stress identification disclosed in participants’ narratives varied as a function of social support, $\chi^2(4, N=176) = 11.53, p < .05, V^* = .18$. The analysis revealed that a greater percentage of participants in non-emotional support condition (52.40%) than non-support condition (27.90%) identified with the authors of previous messages by acknowledging college stress was a serious problem in their lives but did not share their personal experiences of college stress. However, a greater percentage of participants in non-support condition (54.10%) revealed their personal experiences of college stress than participants in non-emotional support condition (28.60%).

Table 7. Main effect of social support on stress identification disclosed in participants’ narratives.

<table>
<thead>
<tr>
<th>Identification</th>
<th>Emotional support</th>
<th>Non-emotional support</th>
<th>Non-support</th>
</tr>
</thead>
<tbody>
<tr>
<td>No identification</td>
<td>9.60%&lt;sup&gt;a&lt;/sup&gt;&lt;sup&gt;A&lt;/sup&gt;</td>
<td>19.00%&lt;sup&gt;a&lt;/sup&gt;&lt;sup&gt;A&lt;/sup&gt;</td>
<td>18.00%&lt;sup&gt;a&lt;/sup&gt;&lt;sup&gt;A&lt;/sup&gt;</td>
</tr>
<tr>
<td>Identification without disclosing personal experience</td>
<td>42.30%&lt;sup&gt;b&lt;/sup&gt;&lt;sup&gt;B&lt;/sup&gt;</td>
<td>52.40%&lt;sup&gt;b&lt;/sup&gt;&lt;sup&gt;B&lt;/sup&gt;</td>
<td>27.90%&lt;sup&gt;b&lt;/sup&gt;&lt;sup&gt;A&lt;/sup&gt;</td>
</tr>
<tr>
<td>Identification with disclosing personal experience</td>
<td>48.10%&lt;sup&gt;b&lt;/sup&gt;&lt;sup&gt;B&lt;/sup&gt;</td>
<td>28.60%&lt;sup&gt;a&lt;/sup&gt;&lt;sup&gt;A&lt;/sup&gt;</td>
<td>54.10%&lt;sup&gt;b&lt;/sup&gt;&lt;sup&gt;B&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

$\chi^2(4, N=176) = 11.53, p < .05, V^* = .18$.

*Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$; within columns, means with no upper case subscript in common differ at $p < .05$. 
Emotional changes. Participants’ emotional changes (i.e., positive versus negative outlook) during the process of generating written responses were drafted through line graphs. Narrative exposure and social support did not influence the number of times the personal narrative went positive and went negative and the total number of emotional changes in each personal narrative. However, a 2X5 chi-square analysis revealed that narrative exposure significantly influenced the position of the ending point of personal narratives, $\chi^2(4, N=176) = 18.07, p < .01, V^* = .32$. A greater percentage of participants in non-narrative conditions (32.60%) than in narrative conditions (10.30%) ended personal narratives at the lowest point (i.e., the most negative outlook), whereas a greater percentage of participants in narrative conditions (66.70%) than in non-narrative conditions (39.30%) ended personal narratives at the highest point (i.e., the most positive outlook). Social support was not found to vary the ending point position of participants’ narratives significantly, $\chi^2(8, N=176) = 8.15, p = .42, V^* = .22$.

Table 8. Position of the emotional ending point of participants’ narratives by narrative exposure.

<table>
<thead>
<tr>
<th></th>
<th>Narrative</th>
<th>Non-narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest point</td>
<td>10.30%_aAC</td>
<td>32.60%_bA</td>
</tr>
<tr>
<td>Middle point but lower than starting point</td>
<td>2.30%_aC</td>
<td>5.60%_bB</td>
</tr>
<tr>
<td>Middle point but higher than the starting point</td>
<td>2.30%_aC</td>
<td>1.10%_aB</td>
</tr>
<tr>
<td>Middle point and similar with starting point</td>
<td>18.40%_aA</td>
<td>21.30%_aA</td>
</tr>
<tr>
<td>Highest point</td>
<td>66.70%_aB</td>
<td>39.30%_aA</td>
</tr>
</tbody>
</table>

$\chi^2(4, N=176) = 18.07, p < .01, V^* = .32$

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$; within columns, means with no upper case subscript in common differ at $p < .05$. 
Figure 7. Position of the emotional ending point of participants’ narratives by narrative exposure.

**Pro-message thoughts.** A 2 (narrative exposure) X 3 (social support) analysis of variance revealed that the amount of pro-message thoughts did not vary as a function of narrative exposure, $F(1, 170) = 1.79, p = .18$, partial $\eta^2 = .01$; social support, $F(1, 170) = 1.13, p = .33$, partial $\eta^2 = .01$; or the interaction of these two factors, $F(2, 170) = .19, p = .83$, partial $\eta^2 = .00$. An analysis of variance also suggested that the variety of pro-message thoughts generated in participants’ narratives did not vary as a function of narrative exposure, $F(1, 170) = .47, p = .49$, partial $\eta^2 = .00$; social support, $F(2, 170) = .44, p = .64$, partial $\eta^2 = .01$; and the interaction of these two factors, $F(2, 170) = .53, p = .59$, partial $\eta^2 = .01$.

**Counter-message thoughts.** A 2 (narrative exposure) X 3 (level of support) analysis of variance on the amount of counter-message thoughts generated in participants’ narratives revealed a main effect of narrative exposure, $F(1, 170) = 12.01, p < .01$, partial $\eta^2 = .06$. Participants in non-narrative conditions ($M = .66, SE = .11$) generated significantly more counter-message thoughts in personal narratives than participants in narrative conditions ($M = .14, SE = .11$). A 2 (narrative
exposure) X 3 (level of support) analysis of variance on the variety of counter-message thoughts generated in participants’ narratives also revealed a main effect of narrative exposure, $F(1, 170) = 16.64, p < .001$, partial $\eta^2 = .09$. Participants in non-narrative conditions ($M = .36, SE = .05$) generated significantly greater variety of counter-arguments when forming personal narratives than participants in narrative conditions ($M = .08, SE = .05$). These findings have been revealed in the statistical test for hypothesis 1. Approaching statistical significance, social support also made a difference on the variety of counter-message thoughts generated in personal narratives, $F(1, 170) = 2.87, p = .06$, partial $\eta^2 = .03$. The lower level social support observed, the greater variety of counter-message thoughts was generated. Approaching statistical significance, an interaction of narrative exposure and social support was also found on the variety of counter-arguments generated in participants’ narratives, $F(2, 170) = 2.35, p = .10$, partial $\eta^2 = .03$. Table 9 summarizes means associated with this interaction. Holm’s sequential bonferroni post hoc tests showed that social support significantly varied the variety of counter-message thoughts generated in participants’ narratives after being exposed to a non-narrative message. Especially, participants who did not observe any social support ($M = .55, SE = .08$) generated significantly greater variety of counter-message thoughts than participants who observed emotional support ($M = 16, SE = .09$) after reading a non-narrative message about college stress.

Table 9. The variety of counter-message thoughts generated in participants’ narratives by conditions.

<table>
<thead>
<tr>
<th>Narrative</th>
<th>Emotional support</th>
<th>Non-emotional support</th>
<th>Non-support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative</td>
<td>$M$</td>
<td>$SE$</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.07$_{aA}$</td>
<td>0.07$_{aA}$</td>
<td>0.09$_{aA}$</td>
</tr>
<tr>
<td>SE</td>
<td>(0.09)</td>
<td>(0.09)</td>
<td>(0.08)</td>
</tr>
<tr>
<td>Non-narrative</td>
<td>$M$</td>
<td>$SE$</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>0.16$_{aA}$</td>
<td>0.37$_{abB}$</td>
<td>0.55$_{bB}$</td>
</tr>
<tr>
<td>SE</td>
<td>(0.09)</td>
<td>(0.08)</td>
<td>(0.08)</td>
</tr>
</tbody>
</table>

$F(2, 170) = 2.35, p = .10$, partial $\eta^2 = .03$.

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, means with no lower case subscript in common differ at $p < .05$; within columns, means with no upper case subscript in common differ at $p < .05$. 

Figure 8. The variety of counter-message thoughts generated in participants’ narratives by conditions.

Referring message-related sleep strategies as solutions. Among participants who wrote a response to engage in the supportive interactions, 35% of them ($N = 72$) referred to one or more sleep strategies suggested in previous messages as solution(s) to deal with college stress. However, the reference to these sleep strategies did not vary as a function of narrative exposure, $\chi^2(1, N=176) = .11, p = .74, V^* = .03$, or social support, $\chi^2(2, N=176) = 34, p = .84, V^* = .04$. The number of sleep strategies referred in participants’ narratives did not vary as a function of narrative exposure $F(1, 170) = .06, p = .81$, partial $\eta^2 = .00$, social support, $F(2, 170) = 1.05, p = .35$, partial $\eta^2 = .01$, or the interaction of these two factors either, $F(2, 170) = .06, p = .42$, partial $\eta^2 = .01$.

Narrative modes. The number of sentences categorized into each narrative mode was analyzed. On average, participants’ narratives consisted of more transformation ($M = 1.97, SD = 1.90$), followed by elaboration ($M = 1.42, SD = 1.84$) and articulation ($M = 1.05, SD = 1.63$). A 2 (narrative exposure) X 3 (social support) analysis of variance revealed that the number of sentences that used articulation mode did not vary as a function of narrative exposure, $F(1, 157) = .49, p = .48$, partial $\eta^2 = .00$, social support, $F(2, 157) = .34, p = .71$, partial $\eta^2 = .00$, and the interaction of these
two factors, $F(2, 157) = 1.57, p = .21$, partial $\eta^2 = .02$. An ANOVA test was also performed on the number of sentences used elaboration mode in participants’ narratives. The analysis revealed that approaching statistical significance, the amount of elaboration varied as a function of narrative exposure, $F(1, 157) = 3.50, p = .06$, partial $\eta^2 = .02$. Participants in narrative conditions ($M = 1.14$, $SE = .19$) demonstrated less elaboration of subjective feelings in their responses than participants in non-narrative conditions ($M = 1.66$, $SE = .20$). The factorial ANOVA test performed on the number of sentences that used transformation mode in participants’ narratives suggested that the amount of transformation varied as a function of narrative exposure, $F(1, 157) = 1.45, p < .001$, partial $\eta^2 = .09$, and the interaction of narrative exposure and social support, $F(2, 157) = 5.52, p < .01$, partial $\eta^2 = .07$. The results suggested that participants in narrative conditions ($M = 2.56$, $SE = .19$) produced significantly more transformation when forming their written responses than participants in non-narrative conditions ($M = 1.46$, $SE = .20$). But as illustrated in Figure 9, the difference caused by narrative exposure versus non-narrative exposure on the amount of transformation was not found among participants who observed emotional support. Table 10 summarizes the percentages associated with this interaction.

Table 10. The number of sentences using transformation mode in participants’ narratives by conditions.

<table>
<thead>
<tr>
<th></th>
<th>Emotional support</th>
<th>Non-emotional support</th>
<th>Non-support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative</td>
<td>$M$</td>
<td>$SE$</td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>1.70$_{aA}$</td>
<td>2.63$_{aA}$</td>
<td>3.33$_{bA}$</td>
</tr>
<tr>
<td>$SE$</td>
<td>(0.34)</td>
<td>(0.34)</td>
<td>(0.32)</td>
</tr>
<tr>
<td>Non-narrative</td>
<td>$M$</td>
<td>$SE$</td>
<td></td>
</tr>
<tr>
<td>$M$</td>
<td>1.74$_{aA}$</td>
<td>1.57$_{ab}$</td>
<td>1.08$_{ab}$</td>
</tr>
<tr>
<td>$SE$</td>
<td>(0.37)</td>
<td>(0.32)</td>
<td>(0.35)</td>
</tr>
</tbody>
</table>

$F(2, 157) = 5.52, p < .01$, partial $\eta^2 = .07$.

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$; within columns, percentage with no upper case subscript in common differ at $p < .05$. 
Figure 9. The number of sentences using transformation mode in participants’ narratives by conditions.

Table 11 summarizes the descriptive statistics of shifts between narrative modes. Six 2 (narrative exposure) X 3 (social support) analyses of variance were performed on each type of shifts between narrative modes. The test suggested no significant result. In other words, shifts between narrative modes did not vary as a function of narrative exposure, social support, or the interaction of these two factors.

Table 11. Descriptive statistics of shifts between narrative modes.

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>N</th>
<th>Percentage</th>
<th>M</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shift from articulation to elaboration</td>
<td>30</td>
<td>15.54%</td>
<td>0.19</td>
<td>0.50</td>
</tr>
<tr>
<td>Shift from articulation to transformation</td>
<td>39</td>
<td>20.21%</td>
<td>0.22</td>
<td>0.49</td>
</tr>
<tr>
<td>Shift from elaboration to transformation</td>
<td>70</td>
<td>36.27%</td>
<td>0.37</td>
<td>0.51</td>
</tr>
<tr>
<td>Shift from elaboration to articulation</td>
<td>28</td>
<td>14.51%</td>
<td>0.18</td>
<td>0.56</td>
</tr>
<tr>
<td>Shift from transformation to articulation</td>
<td>16</td>
<td>8.29%</td>
<td>0.09</td>
<td>0.30</td>
</tr>
<tr>
<td>Shift from transformation to elaboration</td>
<td>18</td>
<td>9.33%</td>
<td>0.10</td>
<td>0.32</td>
</tr>
<tr>
<td>Total number of narrative mode shifts</td>
<td>-</td>
<td>-</td>
<td>1.15</td>
<td>1.48</td>
</tr>
</tbody>
</table>

As argued in the narrative processes model, articulation is an external mode of narrative, focusing on recalling objective experience. Elaboration, on the other hand, is an internal mode of
narrative, focusing on revealing innermost feelings. Transformation is a reflexive mode of narrative, focusing on looking for new explanations for a disturbing experience. Therefore, a hierarchy can be found among these three modes of narrative. The shifts from articulation to elaboration, articulation to transformation, and elaboration to transformation suggest progress in exploring deeper feelings and searching for new meanings (Angus, Lewin, Bouffard & Rotondi-Trevisan, 2004). Following this logic, the narrative modes people used at the beginning and at the end were compared and a new variable called narrative progress was created. First of all, a chi-square analysis found the selection of narrative mode to end participants’ narratives varied as a function of narrative exposure, \( \chi^2(2, N=163) = 8.77, p < .05, V^* = .23 \). A greater percentage of participants in narrative conditions (76.20%) selected to end their written responses using transformation mode than participants in non-narrative conditions (54.40%) (see Table 12). The narrative mode selected to end participants’ narratives did not vary as a function of social support, \( \chi^2(4, N=163) = 2.62, p = .62, V^* = .09 \).

Second, a frequency test showed that 48.2% of participants who wrote a response to engage in existing supportive interactions demonstrated narrative progress (\( N = 93 \)). Chi-square analyses showed that whether participants demonstrated narrative progress varied as a function of narrative exposure, \( \chi^2(1, N=163) = 3.99, p < .05, V^* = .16 \), but not observed social support, \( \chi^2(2, N=163) = 1.86, p = .40, V^* = .11 \). A significantly greater percentage of participants in narrative conditions (53.60%) demonstrated narrative progress than participants in non-narrative conditions (38.00%).

Table 12. Narrative mode selected to end participant’s narrative by narrative exposure.

<table>
<thead>
<tr>
<th>Mode</th>
<th>Narrative</th>
<th>Non-narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Articulation</td>
<td>8.30%(^{aA})</td>
<td>19.00%(^{aA})</td>
</tr>
<tr>
<td>Elaboration</td>
<td>15.50%(^{aA})</td>
<td>26.60%(^{aA})</td>
</tr>
<tr>
<td>Transformation</td>
<td>76.20%(^{aB})</td>
<td>54.40%(^{bB})</td>
</tr>
</tbody>
</table>

\( \chi^2(2, N=163) = 8.77, p < .05, V^* = .23 \).

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at \( p < .05 \); within columns, percentage with no upper case subscript in common differ at \( p < .05 \).
Frame. The frame that participants used to organize their written responses was analyzed. As mentioned in the methodology chapter, the use of different frames indicates unique interpretation, causal attribution and solution of an issue. Personal narratives using the reconstruction frame referred to disclosing one’s stressful experience but finding positive solutions for the negative experience. The use of the internalization frame meant a passive acceptance of college stress as a normal part of life without positively seeking solutions to deal with college stress. Personal narratives using the suffering frame referred to narratives complaining the stressful experience and all negative feelings associated with it. The support frame was used to provide third-person empathy and suggestions to users of the online health support group who suffer from college stress but without disclosing one’s own experiences. The message evaluations frame was used to express opinions, which were usually critical opinions, about previous messages that the author was asked to read. The reconstruction, internalization, suffering, support and message evaluations frames were mutually exclusively coded. Among the five frames, the reconstruction (30.10%) and the support (30.10%) frames were most frequently used, followed by the suffering frame (19.90%), the message evaluations frame (12.10%), and the internalization frame (7.80%). A 2x5 chi-square analysis was performed to examine the impact of narrative exposure on the frame used by participants to organize their personal narratives. The results showed that narrative exposure significantly influenced the selection of frames when forming personal narratives, \( \chi^2(4, N=176) = 18.26, p < .01, V^* = .32 \). Table 13 summarizes the percentage of participants using each frame by narrative exposure. The analyses revealed that a greater percentage of participants used the support frame in narrative conditions (44.80%) than in non-narrative conditions (19.10%). Meanwhile, a greater percentage of participants used the message evaluations frame in non-narrative conditions (19.10%) than in narrative conditions (8.00%). The results indicated that narrative exposure encouraged participants to provide support and meanwhile discouraged them from critically evaluating the messages that they received.
Table 13. The frame selected by participants to form personal narratives by narrative exposure.

<table>
<thead>
<tr>
<th>Frame</th>
<th>Narrative</th>
<th>Non-narrative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction frame</td>
<td>29.90%C</td>
<td>28.10%A</td>
</tr>
<tr>
<td>Internalization frame</td>
<td>3.40%B</td>
<td>10.10%A</td>
</tr>
<tr>
<td>Suffering frame</td>
<td>13.80%BC</td>
<td>23.60%A</td>
</tr>
<tr>
<td>Support frame</td>
<td>44.80%A</td>
<td>19.10%B</td>
</tr>
<tr>
<td>Message evaluations frame</td>
<td>8.00%B</td>
<td>19.10%B</td>
</tr>
</tbody>
</table>

$\chi^2(4, N=176) = 18.26, p < .01, V^* = .32.$

*Note:* Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$; within columns, percentage with no upper case subscript in common differ at $p < .05$.

Figure 10. The frame selected by participants to form personal narratives by narrative exposure.

A 3X5 chi-square analysis was performed to examine the impact of social support on the message frame selected by participants when forming their personal responses. The results showed that social support significantly influenced the selection of frame when forming personal narratives, $\chi^2(8, N=176) = 18.59, p < .05, V^* = .23$. Table 14 presents the percentage of participants using each frame by social support. Observing non-emotional support significantly reduced the chance that participants used the suffering frame to form their responses. The analyses revealed that a greater percentage of participants used the suffering frame in non-support conditions (26.20%) than in non-emotional support conditions (9.50%). Meanwhile, observing non-support significantly reduced the
chance that participants used the support frame to form their responses. A greater percentage of participants used the support frame in emotional support (34.60%) and non-emotional support (46.00%) conditions than in non-support conditions (14.80%).

Table 14. The frame selected by participants to form personal narratives by social support.

<table>
<thead>
<tr>
<th>Frame</th>
<th>Emotional support</th>
<th>Non-emotional support</th>
<th>Non-support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reconstruction frame</td>
<td>25.00%_aAB</td>
<td>22.20%_aAB</td>
<td>39.30%_aA</td>
</tr>
<tr>
<td>Internalization frame</td>
<td>7.70%_aA</td>
<td>6.30%_aA</td>
<td>6.60%_aB</td>
</tr>
<tr>
<td>Suffering frame</td>
<td>21.20%_abAB</td>
<td>9.50%_aA</td>
<td>26.20%_bAB</td>
</tr>
<tr>
<td>Support frame</td>
<td>34.60%_abAB</td>
<td>46.00%_aB</td>
<td>14.80%_bAB</td>
</tr>
<tr>
<td>Message evaluations frame</td>
<td>11.50%_aabAB</td>
<td>15.90%_aA</td>
<td>13.10%_ab</td>
</tr>
</tbody>
</table>

$\chi^2 (8, N=176) = 18.59, p < .05, V^* = .23.$

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$; within columns, percentage with no upper case subscript in common differ at $p < .05$.

Figure 11. The frame selected by participants to form personal narratives by social support.

As scholars suggested, frames can be considered as the core idea of “interpretive packages” that people use to organize and understand the world (Gamson & Modigliani, 1991). To examine how each frame guides the interpretive packages, additional analyses were performed to examine how other features of participants’ narratives were associated with the use of each selected frame.
ANOVA analyses were performed on interval/ratio level narrative attributes by the message frame. Table 15 summarizes the results. The analyses revealed that the number of personal qualities disclosed in participants’ narratives varied when different frames were used, $F(4, 201) = 19.79, p < .001$. Intimacy of self-disclosure also varied when different frames were used, $F(4, 201) = 15.34, p < .001$. Participants’ narratives using the reconstruction frame and the suffering frame disclosed more personal qualities and more intimate information than narratives written using other frames. The number of times each individual narrative went positive, $F(4, 201) = 12.37, p < .001$, and went negative, $F(4, 201) = 6.10, p < .001$, also varied when different frames were used. When the reconstruction frame was used, personal narratives demonstrated more times of increasing as well as decreasing compared with when other frames were used. Meanwhile, the amount and the variety of pro-message thoughts generated in participants’ narratives (the amount of pro-message thoughts: $F(4, 201) = 11.36, p < .001$; the variety of pro-message thoughts: $F(4, 201) = 10.47, p < .001$) and the amount and variety of counter-message thoughts generated in participants’ narratives (the amount of counter-message thoughts: $F(4, 201) = 8.97, p < .001$; the variety of counter-message thoughts: $F(4, 201) = 10.26, p < .001$) also varied when different frames were used. When the reconstruction or the support frame was used, more pro-message thoughts and greater variety of pro-message thoughts were generated in participants’ narratives. When the message evaluation frame was used, in contrast, more counter-message thoughts and greater variety of counter-message thoughts were generated in participants’ narratives. The number of sleep strategies that were referred as solutions in participants’ narratives also varied when different frames were used, $F(4, 201) = 6.50, p < .001$. When the reconstruction or the support frame was used, more sleep strategies mentioned in previous messages were referred in participants’ narratives as solutions. The number of shifts from articulation to elaboration mode, $F(4, 188) = 4.24, p < .001$, shifts from articulation to transformation mode, $F(4, 188) = 10.34, p < .001$, shifts from elaboration to transformation mode, $F(4, 188) = 7.90,
$p < .001$, and shifts from transformation to articulation mode, $F(4, 188) = 5.42, p < .001$, also varied when different frames were used. When the suffering frame was used, personal narratives demonstrated more shifts from articulation to elaboration mode. When the reconstruction frame was used, personal narratives demonstrated more shifts from articulation to transformation mode. When the reconstruction or the support frame was used, personal narratives demonstrated more shifts from elaboration to transformation mode. When the reconstruction frame was used, personal narratives demonstrated more shifts from transformation to articulation mode as well. Finally, the amount of articulation, $F(4, 188) = 10.58, p < .001$, and transformation, $F(4, 188) = 16.27, p < .001$, in participants’ narratives also varied when different frames were used. When the suffering or the reconstruction frame was used, personal narratives contained more articulation. When the reconstruction or the support frame was used, personal narratives contained more transformation.

Table 15. Interval/Ratio level attributes of participants’ narratives by frame.

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Reconstruction frame (N = 62)</th>
<th>Internalization frame (N = 16)</th>
<th>Suffering frame (N = 41)</th>
<th>Support frame (N = 62)</th>
<th>Message evaluations frame (N = 12)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of personal qualities</td>
<td>$M$ 4.14$_a$</td>
<td>0.25$_b$</td>
<td>4.05$_a$</td>
<td>0.68$_b$</td>
<td>1.00$_b$</td>
</tr>
<tr>
<td></td>
<td>$SE$ (0.40)</td>
<td>(0.14)</td>
<td>(0.67)</td>
<td>(0.18)</td>
<td>(0.31)</td>
</tr>
<tr>
<td>Intimacy of self-disclosure</td>
<td>$M$ 1.02$_a$</td>
<td>0.13$_b$</td>
<td>1.00$_a$</td>
<td>0.29$_b$</td>
<td>0.40$_b$</td>
</tr>
<tr>
<td></td>
<td>$SE$ (0.08)</td>
<td>(0.09)</td>
<td>(0.16)</td>
<td>(0.06)</td>
<td>(0.12)</td>
</tr>
<tr>
<td>Number of times that narrative went up</td>
<td>$M$ 1.21$_a$</td>
<td>0.56$_{abc}$</td>
<td>0.59$_{bc}$</td>
<td>0.89$_b$</td>
<td>0.36$_c$</td>
</tr>
<tr>
<td></td>
<td>$SE$ (0.09)</td>
<td>(0.18)</td>
<td>(0.11)</td>
<td>(0.05)</td>
<td>(0.11)</td>
</tr>
<tr>
<td>Number of times that narrative went down</td>
<td>$M$ 1.21$_a$</td>
<td>0.69$_{abc}$</td>
<td>1.15$_{ab}$</td>
<td>0.61$_c$</td>
<td>0.64$_{bc}$</td>
</tr>
<tr>
<td></td>
<td>$SE$ (0.15)</td>
<td>(0.15)</td>
<td>(0.10)</td>
<td>(0.07)</td>
<td>(0.13)</td>
</tr>
<tr>
<td>Amount of pro-message thoughts</td>
<td>$M$ 3.61$_{ac}$</td>
<td>2.12$_{ab}$</td>
<td>4.34$_c$</td>
<td>2.26$_b$</td>
<td>0.84$_b$</td>
</tr>
<tr>
<td></td>
<td>$SE$ (0.30)</td>
<td>(0.55)</td>
<td>(0.54)</td>
<td>(0.24)</td>
<td>(0.19)</td>
</tr>
<tr>
<td></td>
<td>M</td>
<td>SE</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------------------</td>
<td>---------</td>
<td>---------</td>
<td>-------</td>
<td>-------</td>
<td>-------</td>
</tr>
<tr>
<td>Variety of pro-message thoughts</td>
<td>2.05</td>
<td>(0.14)</td>
<td>0.88</td>
<td>(0.13)</td>
<td>1.66</td>
</tr>
<tr>
<td></td>
<td>1.45</td>
<td>(0.13)</td>
<td>0.68</td>
<td>(0.14)</td>
<td></td>
</tr>
<tr>
<td>Amount of counter-message thoughts</td>
<td>0.16</td>
<td>(0.08)</td>
<td>0.44</td>
<td>(0.18)</td>
<td>0.42</td>
</tr>
<tr>
<td></td>
<td>0.15</td>
<td>(0.07)</td>
<td>1.40</td>
<td>(0.32)</td>
<td></td>
</tr>
<tr>
<td>Variety of counter-message thoughts</td>
<td>0.11</td>
<td>(0.05)</td>
<td>0.31</td>
<td>(0.12)</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>0.11</td>
<td>(0.05)</td>
<td>0.72</td>
<td>(0.11)</td>
<td></td>
</tr>
<tr>
<td>Number of sleep strategies referred as solutions</td>
<td>0.58</td>
<td>(0.07)</td>
<td>0.00</td>
<td>(0.00)</td>
<td>0.24</td>
</tr>
<tr>
<td></td>
<td>0.53</td>
<td>(0.10)</td>
<td>0.12</td>
<td>(0.07)</td>
<td></td>
</tr>
<tr>
<td>Shifts from articulation to elaboration mode</td>
<td>0.19</td>
<td>(0.06)</td>
<td>0.06</td>
<td>(0.06)</td>
<td>0.44</td>
</tr>
<tr>
<td></td>
<td>0.06</td>
<td>(0.03)</td>
<td>0.08</td>
<td>(0.08)</td>
<td></td>
</tr>
<tr>
<td>Shifts from articulation to transformation mode</td>
<td>0.52</td>
<td>(0.09)</td>
<td>0.00</td>
<td>(0.00)</td>
<td>0.07</td>
</tr>
<tr>
<td></td>
<td>0.13</td>
<td>(0.04)</td>
<td>0.00</td>
<td>(0.00)</td>
<td></td>
</tr>
<tr>
<td>Shifts from elaboration to transformation mode</td>
<td>0.45</td>
<td>(0.07)</td>
<td>0.38</td>
<td>(0.13)</td>
<td>0.10</td>
</tr>
<tr>
<td></td>
<td>0.55</td>
<td>(0.06)</td>
<td>0.00</td>
<td>(0.00)</td>
<td></td>
</tr>
<tr>
<td>Shifts from transformation to articulation mode</td>
<td>0.23</td>
<td>(0.06)</td>
<td>0.00</td>
<td>(0.00)</td>
<td>0.00</td>
</tr>
<tr>
<td></td>
<td>0.05</td>
<td>(0.03)</td>
<td>0.00</td>
<td>(0.00)</td>
<td></td>
</tr>
<tr>
<td>Articulation</td>
<td>1.32</td>
<td>(0.17)</td>
<td>0.19</td>
<td>(0.14)</td>
<td>2.12</td>
</tr>
<tr>
<td></td>
<td>0.37</td>
<td>(0.11)</td>
<td>0.67</td>
<td>(0.26)</td>
<td></td>
</tr>
<tr>
<td>Transformation</td>
<td>2.34</td>
<td>(0.19)</td>
<td>0.50</td>
<td>(0.16)</td>
<td>1.02</td>
</tr>
<tr>
<td></td>
<td>2.95</td>
<td>(0.23)</td>
<td>0.17</td>
<td>(0.17)</td>
<td></td>
</tr>
</tbody>
</table>

*Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at p < .05.*
Chi-square analyses were performed on nominal level attributes of participants’ narratives. The analyses revealed that participants demonstrated different types of stress identification when using different frames, $\chi^2(8, N=206) = 101.91, p < .001, V^* = .50$. Participants who used the reconstruction frame tended to disclose their own stressful experiences (80.65%). Comparatively, most participants (87.50%) who used the internalization frame admitted the existence of college stress but they did not want to elaborate on their subjective experiences. People who used the suffering frame disclosed their stressful experiences very much (68.29%). People who used the support frame admitted college stress (61.29%) but did not spend much time to describe their own experiences. Not many participants who used the message frame disclosed their own stressful experiences (16.00%).

Table 16. Stress identification by frame.

<table>
<thead>
<tr>
<th>Evaluation frame</th>
<th>Reconstruction frame</th>
<th>Internalization frame</th>
<th>Suffering frame</th>
<th>Support frame</th>
<th>Message evaluations frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>No identification</td>
<td>3.23%$_{aA}$</td>
<td>12.50%$_{aA}$</td>
<td>4.88%$_{aA}$</td>
<td>25.81%$_{bA}$</td>
<td>44.00%$_{abA}$</td>
</tr>
<tr>
<td>Identification without disclosing personal experience</td>
<td>16.13%$_{aA}$</td>
<td>87.50%$_{aB}$</td>
<td>26.83%$_{aB}$</td>
<td>61.29%$_{bB}$</td>
<td>40.00%$_{aA}$</td>
</tr>
<tr>
<td>Identification with disclosing personal experience</td>
<td>80.65%$_{abB}$</td>
<td>0.00%</td>
<td>68.29%$_{aC}$</td>
<td>12.90%$_{bA}$</td>
<td>16.00%$_{bA}$</td>
</tr>
</tbody>
</table>

$\chi^2(8, N=206) = 101.91, p < .001, V^* = .50$.

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$; within columns, percentage with no upper case subscript in common differ at $p < .05$.

A chi-square analysis was conducted to examine whether the ending position of participants’ narratives, which suggested participants’ positive or negative outlooks of the stress problem, varied when using different frames. The chi-square analysis revealed a significant effect, $\chi^2(16, N=206) = 111.69, p < .001, V^* = .37$. Table 17 summarizes the findings associated with this chi-square analysis. Participants who used the reconstruction frame or the support frame tended to end their responses with the most positive outlook. Participants who used the internalization frame or the
message evaluations frame had relatively equal chance to end their responses with most negative, most positive or similar outlook that they used when they started their responses to end their responses. Participants who used the suffering frame tended to end their narratives with the most negative outlook.

Table 17. Position of emotional ending point by frame.

<table>
<thead>
<tr>
<th></th>
<th>Reconstruction frame</th>
<th>Internalization frame</th>
<th>Suffering frame</th>
<th>Support frame</th>
<th>Message evaluations frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lowest point</td>
<td>3.23%(_{ba})</td>
<td>25.00%(_{bA})</td>
<td>60.98%(_{aA})</td>
<td>3.23%(_{bAB})</td>
<td>48.00%(_{abA})</td>
</tr>
<tr>
<td>Middle point but</td>
<td>3.23%(_{aA})</td>
<td>0.00%</td>
<td>12.20%(_{aB})</td>
<td>1.61%(_{aA})</td>
<td>0.00%</td>
</tr>
<tr>
<td>lower than starting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>point</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle point but</td>
<td>4.76%(_{aA})</td>
<td>0.00%</td>
<td>0.00%</td>
<td>1.61%(_{aA})</td>
<td>0.00%</td>
</tr>
<tr>
<td>higher than the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>starting point</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Middle point and</td>
<td>12.70%(_{aA})</td>
<td>43.75%(_{aA})</td>
<td>12.20%(_{aB})</td>
<td>17.74%(_{aB})</td>
<td>36.00%(_{aA})</td>
</tr>
<tr>
<td>similar with starting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>point</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest point</td>
<td>77.42%(_{aB})</td>
<td>31.25%(_{bA})</td>
<td>14.63%(_{bB})</td>
<td>75.81%(_{aC})</td>
<td>16.00%(_{bA})</td>
</tr>
</tbody>
</table>

\(\chi^2(16, N=206) = 111.69, p < .001, V^* = .37.\)

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at \(p < .05\); within columns, percentage with no upper case subscript in common differ at \(p < .05\).

The narrative modes that participants used to start and end their responses were analyzed. As mentioned before, a variable called narrative progress was created. A chi-square analysis on narrative progress by frame was conducted. The analysis revealed that participants who used different frames demonstrated different likelihood of showing progress in personal narratives, \(\chi^2(4, N=193) = 24.95, p < .001, V^* = .36.\) Table 18 presents the percentages associated with this chi-square analysis. A greater percentage of participants who used the reconstruction (66.13%) or the support frame (54.84%) demonstrated narrative progress than participants who used the internalization (37.50%), the suffering (26.83%) or the message evaluations frame (8.33%).
Table 18. Narrative progress by frame.

<table>
<thead>
<tr>
<th>Progress</th>
<th>Reconstruction frame</th>
<th>Internalization frame</th>
<th>Suffering frame</th>
<th>Support frame</th>
<th>Message evaluations frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Progress</td>
<td>66.13%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>37.50%&lt;sup&gt;b&lt;/sup&gt;</td>
<td>26.83%&lt;sup&gt;b&lt;/sup&gt;</td>
<td>54.84%&lt;sup&gt;a&lt;/sup&gt;</td>
<td>8.33%&lt;sup&gt;b&lt;/sup&gt;</td>
</tr>
</tbody>
</table>

\[ \chi^2(4, N=193) = 24.95, p < .001, V* = .36. \]

*Note:* Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at \( p < .05 \).

In summary, participants’ narratives using the reconstruction frame contained greater self-qualities, greater intimate information, greater disclosure of personal stressful experience and moderate amount of articulation. Written responses using this frame were also more positive. For example, the participants’ narratives using this frame, compared with narratives using other frames, had greater number of times that narratives went more positively, and were ended with the authors’ most positive outlooks more frequently. Written responses using this frame also included greater amount and greater variety of pro-message thoughts, fewer amount and fewer variety of counter-message thoughts and more frequent references to sleep strategies suggested by previous experimental messages. Last, responses using this frame contained greater amount of transformation, demonstrated more shifts from articulation to transformation model, elaboration to transformation mode, and transformation to articulation mode, and a greater percentage of narratives using this frame demonstrated narrative progress.

Personal narratives using the internalization frame also showed recognizable features. First of all, this type of narratives contained least personal qualities, least intimate information, least amount of articulation and no disclosure of personal stressful experience even most of the authors admitted that stress was a common problem in their lives. In addition, participants who used the internalization frame demonstrated least amount and variety of pro-message thoughts, moderate amount and variety of counter-message thoughts, almost zero reference to the sleep strategies recommended in previous message, minimal amount of transformation and minimal shifts between different narrative modes in written responses.
Participants who used the suffering frame disclosed a great amount of personal qualities, high intimate information, and details about their stressful experiences besides admitting the existence of the problem and used articulation a lot in written responses. Personal narratives using this frame contained greatest amount of pro-messages thoughts, moderate amount of counter-message thoughts, moderate reference to sleep strategies recommended by previous messages, and moderate amount of transformation. Narratives using this frame demonstrated significantly more shifts from articulation to elaboration mode but did not demonstrate so many shifts from articulation or elaboration mode to transformation mode. Therefore, less percentages of participants using this frame demonstrated narrative progress. Also, most participants who used this frame to construct their own responses selected to end their responses with the most negative outlook.

The use of the support frame was associated with moderate disclosure of personal qualities, least disclosure of intimate personal information, less than moderate disclosure of personal experience on college stress, and least amount of articulation. Meanwhile, personal narratives using this frame demonstrated relatively greater number of times that narratives went up and relatively less number of times that narratives went down. Most participants using this frame selected to end their responses with their most positive outlook. In addition, the responses using this frame included moderate amount and moderate variety of pro-message thoughts, least amount and least variety of counter-message thoughts, highest reference to sleep strategies suggested by previous messages, and greatest amount of transformation. The participants who used this frame demonstrated frequent shifts from elaboration to transformation mode in their writings.

Last, participants who used the message evaluations frame disclosed relatively low amount of personal qualities and moderate amount of intimate information, and demonstrated least emotional changes through the whole narrative. This type of narratives contained least amount and least variety of pro-message thoughts and greatest amount and greatest variety of counter-message thoughts.
Personal narratives using this frame contained least amount of transformation and relatively low reference to sleep strategies mentioned in previous message, and least percentage of participants using this frame demonstrated narrative progress. It is important to note that some responses using the message evaluations frame contained no personal information. Therefore, the narrative modes (i.e., articulation, elaboration, and transformation) developed in narrative therapy cannot be applied in analyzing personal narratives using the message evaluations frame and were coded as missing. It partially explained why narrative progress was relatively low when participants using the message evaluations frame.

**Personal narratives and persuasion**

Research question 3 addressed the relationships between attributes of personal narratives and persuasion outcomes. To answer this question, conventional persuasion outcomes including the number of counter-message thoughts, the number of pro-message thoughts, emotional responses, attitudes and behavioral intentions were examined as dependent variables. Table 19 summarizes Pearson correlations between attributes of participants’ narratives and the amounts of pro-message and counter-message thoughts generated by participants. The correlation analyses suggested that the length of self-disclosure was strongly correlated with the number of both pro-message thoughts \((r = .70, p < .01)\) and counter-message thoughts \((r = .32, p < .01)\) generated in participants’ narratives. The same pattern was found on the amount of articulation (pro-message thoughts: \(r = .50, p < .01\); counter-message thoughts: \(r = .39, p < .01\)), the number of shifts from articulation to elaboration (pro-message thoughts: \(r = .60, p < .01\); counter-message thoughts: \(r = .27, p < .01\)), the number of shifts from elaboration to articulation (pro-message thoughts: \(r = .60, p < .01\); counter-message thoughts: \(r = .27, p < .01\)), and the number of shifts from transformation to elaboration (pro-message thoughts: \(r = .35, p < .01\); counter-message thoughts: \(r = .20, p < .01\)). Frequent shifts of narrative modes may indicate a lot of cognitive activities that participants went through, which were
associated with a greater number of pro-message thoughts and a greater number of counter-message thoughts generated in participants’ narratives.

Table 20 presents the correlations between attributes of participants’ narratives and reported emotional responses. Among all the attributes of participants’ narratives, the number of shifts from transformation to elaboration, the amount of articulation and the amount of transformation were correlated with variances of reported emotional responses more frequently. The number of shifts from transformation to elaboration was negatively related to disgust ($r = -0.16$, $p < 0.05$), fear ($r = -0.17$, $p < 0.05$) and sadness ($r = -0.19$, $p < 0.05$). The amount of articulation was positively related to fear ($r = 0.18$, $p < 0.05$) and anger ($r = 0.16$, $p < 0.05$). The amount of transformation was positively related to sympathy ($r = 0.19$, $p < 0.01$), and was negatively related to fear ($r = -0.20$, $p < 0.01$) and sadness ($r = -0.17$, $p < 0.01$).

Table 19. Correlations between attributes of participants’ narratives, and pro-message thoughts and counter-message thoughts.

<table>
<thead>
<tr>
<th>Number of pro-message thoughts</th>
<th>Number of counter-message thoughts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of personal qualities</td>
<td>0.60**</td>
</tr>
<tr>
<td>Intimacy of self-disclosure</td>
<td>0.33**</td>
</tr>
<tr>
<td>Length of self-disclosure</td>
<td>0.70**</td>
</tr>
<tr>
<td>Number of times that narrative went up</td>
<td>0.32**</td>
</tr>
<tr>
<td>Number of times that narrative went down</td>
<td>0.28**</td>
</tr>
<tr>
<td>Emotional change</td>
<td>0.36**</td>
</tr>
<tr>
<td>Number of sleep strategies referred</td>
<td>0.36**</td>
</tr>
<tr>
<td>Number of shifts from articulation to elaboration</td>
<td>0.60**</td>
</tr>
<tr>
<td>Number of shifts from articulation to transformation</td>
<td>0.20**</td>
</tr>
<tr>
<td>Number of shifts from elaboration to articulation</td>
<td>0.52**</td>
</tr>
<tr>
<td>Number of shifts from elaboration to transformation</td>
<td>0.08</td>
</tr>
<tr>
<td>Number of shifts from transformation to articulation</td>
<td>0.10</td>
</tr>
<tr>
<td>Number of shifts from transformation to elaboration</td>
<td>0.35**</td>
</tr>
<tr>
<td>Articulation</td>
<td>0.50**</td>
</tr>
<tr>
<td>Elaboration</td>
<td>0.05</td>
</tr>
<tr>
<td>Transformation</td>
<td>0.36**</td>
</tr>
</tbody>
</table>

Note: **$p < .01$, *$p < .05$.}
<table>
<thead>
<tr>
<th></th>
<th>Sympathy</th>
<th>Happiness</th>
<th>Disgust</th>
<th>Surprise</th>
<th>Fear</th>
<th>Sadness</th>
<th>Anger</th>
<th>Shame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of personal qualities</td>
<td>0.03</td>
<td>-0.01</td>
<td>-0.07</td>
<td>-0.10</td>
<td>0.11</td>
<td>0.00</td>
<td>0.05</td>
<td>0.04</td>
</tr>
<tr>
<td>Intimacy of self-disclosure</td>
<td>0.06</td>
<td>0.08</td>
<td>-0.02</td>
<td>-0.05</td>
<td>0.12</td>
<td>0.04</td>
<td>0.07</td>
<td>0.03</td>
</tr>
<tr>
<td>Length of self-disclosure</td>
<td>0.10</td>
<td>-0.01</td>
<td>-0.06</td>
<td>-0.06</td>
<td>0.00</td>
<td>-0.06</td>
<td>0.09</td>
<td>0.03</td>
</tr>
<tr>
<td>Number of times that narrative went up</td>
<td>0.13</td>
<td>0.04</td>
<td>-0.12</td>
<td>-0.07</td>
<td>-0.07</td>
<td>-0.10</td>
<td>-0.15*</td>
<td>-0.02</td>
</tr>
<tr>
<td>Number of times that narrative went down</td>
<td>0.07</td>
<td>0.07</td>
<td>-0.08</td>
<td>-0.05</td>
<td>-0.05</td>
<td>-0.04</td>
<td>-0.01</td>
<td>-0.04</td>
</tr>
<tr>
<td>Emotional change</td>
<td>0.11</td>
<td>0.07</td>
<td>-0.12</td>
<td>-0.07</td>
<td>-0.07</td>
<td>-0.08</td>
<td>-0.09</td>
<td>-0.04</td>
</tr>
<tr>
<td>Number of sleep strategies referred</td>
<td>0.08</td>
<td>-0.03</td>
<td>-0.11</td>
<td>-0.01</td>
<td>-0.04</td>
<td>-0.03</td>
<td>-0.07</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of shifts from articulation to elaboration</td>
<td>0.05</td>
<td>-0.07</td>
<td>-0.01</td>
<td>-0.04</td>
<td>0.03</td>
<td>0.02</td>
<td>0.11</td>
<td>-0.02</td>
</tr>
<tr>
<td>Number of shifts from articulation to transformation</td>
<td>0.08</td>
<td>0.06</td>
<td>-0.03</td>
<td>-0.04</td>
<td>-0.01</td>
<td>-0.10</td>
<td>-0.04</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of shifts from elaboration to articulation</td>
<td>-0.05</td>
<td>-0.06</td>
<td>0.01</td>
<td>-0.03</td>
<td>0.05</td>
<td>-0.03</td>
<td>0.15*</td>
<td>0.01</td>
</tr>
<tr>
<td>Number of shifts from elaboration to transformation</td>
<td>0.15*</td>
<td>0.10</td>
<td>-0.07</td>
<td>-0.01</td>
<td>-0.10</td>
<td>-0.08</td>
<td>-0.09</td>
<td>-0.03</td>
</tr>
<tr>
<td>Number of shifts from transformation to articulation</td>
<td>0.08</td>
<td>0.07</td>
<td>-0.12</td>
<td>-0.07</td>
<td>-0.12</td>
<td>-0.15*</td>
<td>-0.09</td>
<td>-0.04</td>
</tr>
<tr>
<td>Number of shifts from transformation to elaboration</td>
<td>0.05</td>
<td>0.14</td>
<td>-0.16*</td>
<td>-0.14</td>
<td>-0.17*</td>
<td>-0.19*</td>
<td>-0.12</td>
<td>-0.09</td>
</tr>
<tr>
<td>Articulation</td>
<td>0.02</td>
<td>-0.07</td>
<td>0.03</td>
<td>0.01</td>
<td>0.18*</td>
<td>0.03</td>
<td>0.16*</td>
<td>0.07</td>
</tr>
<tr>
<td>Elaboration</td>
<td>0.08</td>
<td>0.07</td>
<td>-0.01</td>
<td>0.00</td>
<td>0.04</td>
<td>0.03</td>
<td>0.13</td>
<td>-0.02</td>
</tr>
<tr>
<td>Transformation</td>
<td>0.19**</td>
<td>0.01</td>
<td>-0.14</td>
<td>-0.13</td>
<td>-0.20**</td>
<td>-0.17**</td>
<td>-0.13</td>
<td>-0.03</td>
</tr>
</tbody>
</table>

Note: **p < .01, * p < .05.
Table 21 summarizes Pearson correlations between attributes of participants’ narratives and attitudes/behavioral intentions. The analyses revealed that participants who reported greater general behavioral intention reported less intimate personal information \((r = -0.16, p < .01)\), less shifts from articulation to elaboration \((r = -0.19, p < .01)\) and less shifts from elaboration to articulation \((r = -0.16, p < .01)\). Participants who referred to more sleep strategies when forming their responses reported greater attitudes \((r = 0.16, p < .05)\) and greater intentions to perform sleep strategies suggested by the main message.

Table 21. Correlations between attributes of participants’ narratives, and attitudes and behavioral intentions.

<table>
<thead>
<tr>
<th></th>
<th>Attitudes</th>
<th>General behavioral intention</th>
<th>Intentions to perform sleep strategies suggested by the main message</th>
<th>Intentions to perform sleep strategies suggested by reply messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of personal qualities</td>
<td>-0.04</td>
<td>-0.08</td>
<td>0.07</td>
<td>0.12</td>
</tr>
<tr>
<td>Intimacy of self-disclosure</td>
<td>-0.10</td>
<td>-0.16**</td>
<td>-0.07</td>
<td>0.05</td>
</tr>
<tr>
<td>Length of self-disclosure</td>
<td>-0.01</td>
<td>-0.05</td>
<td>0.14</td>
<td>0.14*</td>
</tr>
<tr>
<td>Number of times that narrative went up</td>
<td>0.11</td>
<td>0.06</td>
<td>0.13</td>
<td>0.12</td>
</tr>
<tr>
<td>Number of times that narrative went down</td>
<td>-0.03</td>
<td>-0.07</td>
<td>0.04</td>
<td>0.05</td>
</tr>
<tr>
<td>Emotional change</td>
<td>0.04</td>
<td>-0.02</td>
<td>0.10</td>
<td>0.09</td>
</tr>
<tr>
<td>Number of sleep strategies referred</td>
<td>0.16*</td>
<td>0.09</td>
<td>0.18*</td>
<td>0.13</td>
</tr>
<tr>
<td>Number of shifts from articulation to elaboration</td>
<td>-0.04</td>
<td>-0.19**</td>
<td>0.05</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of shifts from articulation to transformation</td>
<td>0.09</td>
<td>-0.02</td>
<td>0.06</td>
<td>0.09</td>
</tr>
<tr>
<td>Number of shifts from elaboration to articulation</td>
<td>-0.10</td>
<td>-0.16**</td>
<td>0.02</td>
<td>0.05</td>
</tr>
<tr>
<td>Number of shifts from elaboration to transformation</td>
<td>0.07</td>
<td>0.13</td>
<td>0.11</td>
<td>0.03</td>
</tr>
<tr>
<td>Number of shifts from transformation to articulation</td>
<td>-0.02</td>
<td>0.03</td>
<td>0.00</td>
<td>0.06</td>
</tr>
<tr>
<td>Number of shifts from transformation to elaboration</td>
<td>0.01</td>
<td>-0.01</td>
<td>0.02</td>
<td>0.08</td>
</tr>
<tr>
<td>Articulation</td>
<td>-0.12</td>
<td>-0.14</td>
<td>-0.05</td>
<td>0.06</td>
</tr>
<tr>
<td>Elaboration</td>
<td>0.00</td>
<td>0.04</td>
<td>0.12</td>
<td>0.11</td>
</tr>
<tr>
<td>Transformation</td>
<td>0.18**</td>
<td>0.11</td>
<td>0.17*</td>
<td>0.14*</td>
</tr>
</tbody>
</table>

*Note: **p < .01, *p < .05.*
main message \((r = .18, p < .05)\). Participants who demonstrated greater amount of transformation in their responses reported greater attitudes \((r = .18, p < .01)\), greater intentions to perform sleep strategies suggested by the main message \((r = .17, p < .05)\), and greater intentions to perform sleep strategies suggested by the reply messages \((r = .14, p < .05)\).

One way ANOVAs were performed on dependent variables by stress identification. The analyses revealed that happiness varied significantly as a function of stress identification, \(F(2, 200) = 4.38, p < .05\). Participants who identified with authors of previous messages and disclosed their personal experiences reported significantly greater happiness after reading the messages than participants who denied college stress (no identification: \(M = 1.40, SD = 1.40\); identification without disclosing personal experience: \(M = 2.19, SD = 1.40\); identification with disclosing personal experience: \(M = 2.27, SD = 1.55\)). The amount of pro-message thoughts, \(F(2, 203) = 27.89, p < .001\), and the amount of counter-message thoughts, \(F(2, 203) = 3.50, p < .05\), also varied as a function of stress identification. Participants who identified with authors of previous messages reported more pro-message thoughts than participant who denied college stress (no identification: \(M = 4.11, SD = 2.89\); identification without disclosing personal experience: \(M = 2.43, SD = 1.97\); identification with disclosing personal experience: \(M = .76, SD = 1.06\)). Meanwhile, participants who identified with authors of previous messages reported less counter-message thoughts than participant who denied college stress (no identification: \(M = .36, SD = 1.20\); identification without disclosing personal experience: \(M = .24, SD = .66\); identification with disclosing personal experience: \(M = .79, SD = 1.17\)). Approaching statistical significance, the analyses found sympathy varied as a function of stress identification, \(F(2, 199) = 2.91, p = .06\). Participants who identified with authors of previous messages reported greater sympathy than participants who denied college stress (no identification: \(M = 1.84, SD = 1.59\); identification without disclosing personal experience: \(M = 2.58, SD = 1.60\); identification with disclosing personal experience: \(M = 2.58, SD = 1.52\)). Similarly, approaching
statistical significance, general behavioral intention varied as a function of stress identification, $F(2, 201) = 2.72, p = .07$. However, results showed that participants who demonstrated greater identification with authors of the previous messages reported lower intentions to maintain sleep to deal with stress (no identification: $M = 4.42, SD = 1.26$; identification without disclosing personal experience: $M = 4.01, SD = 1.41$; identification with disclosing personal experience: $M = 3.76, SD = 1.48$). Table 22 summarizes the means associated with these ANOVA tests.

Table 22. Persuasion by stress identification.

<table>
<thead>
<tr>
<th>Dependent Variables</th>
<th>No identification</th>
<th>Identification without disclosing personal experience</th>
<th>Identification with disclosing personal experience</th>
</tr>
</thead>
<tbody>
<tr>
<td>Happiness</td>
<td>$M = 1.40_a$</td>
<td>$2.19_{ab}$</td>
<td>$2.27_b$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.25)$</td>
<td>$(0.15)$</td>
<td>$(0.17)$</td>
</tr>
<tr>
<td>Sympathy</td>
<td>$M = 1.84$</td>
<td>$2.58$</td>
<td>$2.58$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.29)$</td>
<td>$(0.18)$</td>
<td>$(0.16)$</td>
</tr>
<tr>
<td>Number of pro-message thoughts</td>
<td>$M = 0.76_a$</td>
<td>$2.43_b$</td>
<td>$4.11_c$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.18)$</td>
<td>$(0.21)$</td>
<td>$(0.30)$</td>
</tr>
<tr>
<td>Number of counter-message thoughts</td>
<td>$M = 0.78_a$</td>
<td>$0.24_b$</td>
<td>$0.36_{ab}$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.20)$</td>
<td>$(0.07)$</td>
<td>$(0.13)$</td>
</tr>
<tr>
<td>General behavioral intention</td>
<td>$M = 4.42$</td>
<td>$4.01$</td>
<td>$3.76$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.22)$</td>
<td>$(0.15)$</td>
<td>$(0.16)$</td>
</tr>
</tbody>
</table>

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$.

One way ANOVAs were also performed to examine whether the selection of different frames made a difference on persuasion outcomes. The analyses revealed that participants used different frames to form their responses reported significantly differently on happiness, $F(4, 198) = 2.62, p < .05$; fear, $F(4, 198) = 4.20, p < .01$; sadness, $F(4, 192) = 3.28, p < .05$; anger, $F(4, 196) = 4.39, p < .01$; attitudes, $F(4, 198) = 4.44, p < .01$; and general behavioral intention, $F(4, 199) = 2.65, p < .05$. Approaching statistical significance, frame selection also made a difference on sympathy,
Table 23 summarizes the means associated with these ANOVA tests.

Specifically, participants who used the reconstruction frame reported significantly less fear ($M = .87, SE = .16$), less anger ($M = 1.10, SE = .17$), more pro-message thoughts ($M = 3.61, SE = .30$), and more favorable attitudes ($M = 4.60, SE = .16$). Participants who used the internalization frame reported significantly greater sadness ($M = 1.74, SE = .41$) and less favorable attitudes ($M = 3.94, SE = .30$). Participants who used the suffering frame reported significantly greater fear ($M = 1.74, SE = .26$), greater sadness ($M = 1.77, SE = .26$), greater anger ($M = 1.93, SE = .25$), more pro-message

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Reconstruction frame</th>
<th>Internalization frame</th>
<th>Suffering frame</th>
<th>Support frame</th>
<th>Message evaluations frame</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sympathy</td>
<td>$M = 2.66$</td>
<td>$M = 2.03$</td>
<td>$M = 2.4$</td>
<td>$M = 2.73$</td>
<td>$M = 1.75$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.19)$</td>
<td>$SE = (0.40)$</td>
<td>$SE = (0.26)$</td>
<td>$SE = (0.19)$</td>
<td>$SE = (0.38)$</td>
</tr>
<tr>
<td>Happiness</td>
<td>$M = 2.7$</td>
<td>$M = 2.02$</td>
<td>$M = 1.9$</td>
<td>$M = 1.86$</td>
<td>$M = 1.81$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.18)$</td>
<td>$SE = (0.34)$</td>
<td>$SE = (0.27)$</td>
<td>$SE = (0.18)$</td>
<td>$SE = (0.30)$</td>
</tr>
<tr>
<td>Fear</td>
<td>$M = 0.87_a$</td>
<td>$M = 1.44_{ab}$</td>
<td>$M = 1.74_b$</td>
<td>$M = 0.73_a$</td>
<td>$M = 0.71_a$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.16)$</td>
<td>$SE = (0.46)$</td>
<td>$SE = (0.26)$</td>
<td>$SE = (0.15)$</td>
<td>$SE = (0.29)$</td>
</tr>
<tr>
<td>Sadness</td>
<td>$M = 1.08_{ab}$</td>
<td>$M = 1.74_a$</td>
<td>$M = 1.77_a$</td>
<td>$M = 1.06_{ab}$</td>
<td>$M = 0.76_b$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.16)$</td>
<td>$SE = (0.41)$</td>
<td>$SE = (0.26)$</td>
<td>$SE = (0.15)$</td>
<td>$SE = (0.27)$</td>
</tr>
<tr>
<td>Anger</td>
<td>$M = 1.10_a$</td>
<td>$M = 1.56_{ab}$</td>
<td>$M = 1.93_b$</td>
<td>$M = 0.88_a$</td>
<td>$M = 1.69_{ab}$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.17)$</td>
<td>$SE = (0.37)$</td>
<td>$SE = (0.25)$</td>
<td>$SE = (0.14)$</td>
<td>$SE = (0.35)$</td>
</tr>
<tr>
<td>Number of pro-</td>
<td>$M = 3.61_{ab}$</td>
<td>$M = 2.13_{bc}$</td>
<td>$M = 4.34_a$</td>
<td>$M = 2.26_c$</td>
<td>$M = 0.84_c$</td>
</tr>
<tr>
<td>message thoughts</td>
<td>$SE = (0.30)$</td>
<td>$SE = (0.55)$</td>
<td>$SE = (0.54)$</td>
<td>$SE = (0.24)$</td>
<td>$SE = (0.19)$</td>
</tr>
<tr>
<td>Number of counter-</td>
<td>$M = 0.16_a$</td>
<td>$M = 0.44_a$</td>
<td>$M = 0.41_a$</td>
<td>$M = 0.15_a$</td>
<td>$M = 1.40_b$</td>
</tr>
<tr>
<td>message thoughts</td>
<td>$SE = (0.08)$</td>
<td>$SE = (0.18)$</td>
<td>$SE = (0.21)$</td>
<td>$SE = (0.07)$</td>
<td>$SE = (0.32)$</td>
</tr>
<tr>
<td>Attitudes</td>
<td>$M = 4.60_a$</td>
<td>$M = 3.94_b$</td>
<td>$M = 4.15_b$</td>
<td>$M = 4.91_a$</td>
<td>$M = 4.19_{ab}$</td>
</tr>
<tr>
<td></td>
<td>$SE = (0.16)$</td>
<td>$SE = (0.30)$</td>
<td>$SE = (0.18)$</td>
<td>$SE = (0.12)$</td>
<td>$SE = (0.28)$</td>
</tr>
<tr>
<td>General behavioral</td>
<td>$M = 4.07_{ab}$</td>
<td>$M = 3.84_{ab}$</td>
<td>$M = 3.41_a$</td>
<td>$M = 4.31_b$</td>
<td>$M = 3.81_{ab}$</td>
</tr>
<tr>
<td>intention</td>
<td>$SE = (0.19)$</td>
<td>$SE = (0.29)$</td>
<td>$SE = (0.25)$</td>
<td>$SE = (0.16)$</td>
<td>$SE = (0.31)$</td>
</tr>
</tbody>
</table>

Note: Using Holm’s sequential bonferroni post hoc comparisons, within rows, percentages with no lower case subscript in common differ at $p < .05$. 
thoughts ($M = 4.34, SE = .54$), less favorable attitudes ($M = 4.15, SE = .18$) and less general behavioral intention ($M = 3.41, SE = .25$). Participants who used the support frame reported significantly less fear ($M = .73, SE = .15$), less anger ($M = .88, SE = .14$), more favorable attitudes ($M = 4.91, SE = 0.12$) and greater behavioral intention ($M = 4.31, SE = .16$). Participants who used the message evaluations frame reported significantly less fear ($M = .71, SE = .29$), less sadness ($M = .76, SE = .27$), less pro-message thoughts ($M = .84, SE = .19$) and more counter-message thoughts ($M = 1.40, SE = 32$). The difference could be clearly seen from Figure 12 to Figure 14.

Figure 12. Emotional responses by frame.

![Figure 12](image1.png)

Figure 13. Pro- and counter-message thoughts by frame.

![Figure 13](image2.png)
Figure 14. Attitudes and general behavioral intention by frame.

**Weak tie network concerns and effects**

Research question 1 asked how weak tie network concerns influenced responses to supportive interactions. Perceived vulnerability and perceived security concern were measured in this study as situational weak tie network concerns. A 2 (narrative exposure) X 3 (social support) analysis of variance was performed on perceived vulnerability. Approaching statistical significance, a main effect of social support was found, $F(2, 207) = 2.91, p = .06$, partial $\eta^2 = .03$. Participants in non-emotional support conditions ($M = 2.93, SE = .15$) tended to report higher perceived vulnerability than participants in emotional support conditions ($M = 2.40, SE = .16$). A 2 (narrative exposure) X 3 (level of support) analysis of variance on perceived security concern revealed a main effect of narrative exposure, $F(1, 207) = 11.35, p < .01$, partial $\eta^2 = .05$. Participants in narrative conditions ($M = 3.60, SE = .15$) reported significantly higher security concern than participants in non-narrative conditions ($M = 2.86, SE = .16$).

Table 24 presents the correlations of situational weak tie network concerns and perceived supportiveness of the online health support group. Perceived vulnerability was negatively correlated with perceived emotional support, $r = -.48, p < .001$, and perceived informational support, $r = -.52, p$
< .001. Surprisingly, perceived security concern was positively related to perceived emotional support, $r = .26$, $p < .001$, and perceived informational support, $r = .25$, $p < .001$.

Table 24. Pearson correlations of online health support group perceptions.

<table>
<thead>
<tr>
<th></th>
<th>Perceived informational support</th>
<th>Perceived vulnerability</th>
<th>Perceived security concern</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived emotional support</td>
<td>0.83***</td>
<td>-0.48***</td>
<td>0.26***</td>
</tr>
<tr>
<td>Perceived informational support</td>
<td>-0.52***</td>
<td></td>
<td>0.25***</td>
</tr>
</tbody>
</table>

*Note: ***$p < .001$.

Independent t-tests were performed to examine whether weak tie network concerns inhibit online health support group participation. The analyses suggested that participants who participated in the online health support group by writing a response ($M = 3.12$, $SD = 1.63$) demonstrated significantly less security concern than participants who refused to participate in the online health support group and did not write a response ($M = 3.78$, $SD = 1.54$), $t(211) = 2.37$, $p < .05$. No statistical difference was found on perceived vulnerability between participants who voluntarily wrote a response or not.

ANOVA analyses were performed to examine whether weak tie network concerns influenced the frame selected to form participants’ narratives. The results suggested that participants selecting different frames did not report statistical significance on perceived security concern, $F(4, 167) = 0.68$, $p = .61$. Approaching statistical significance, participants using different frames reported difference on perceived vulnerability, $F(4, 166) = 2.12$, $p = .08$. Holm’s sequential bonferroni post hoc comparisons showed that participants who used the message evaluations frame ($M = 2.39$, $SD = 1.23$) reported significantly greater perceived vulnerability than participants who used the reconstruction frame ($M = 3.35$, $SD = 1.56$).

Besides situational weak tie network concerns influenced by encountered messages, this study also examined participant’s relational motivations of Internet use, which were considered as
long-term weak tie concerns. As the reliability of the two measures of relational motivations of Internet use when using together was low, they were separately treated in statistical analyses. The results of the analyses showed that long-term weak tie concerns also influenced support perceptions. Participants who seek personal meaningful communication with other people online reported greater perceived emotional support ($r = .16, p < .05$). No significant result was found on the other measure.

**Summary and additional analyses**

As mentioned before, the relationships between identification and attitudes/behavioral intentions were not statistically different between the narrative group and the non-narrative groups. It means this study failed to find identification as the mediating mechanism of narrative exposure and persuasion. Therefore, additional analyses were performed to examine whether the amount of cognitive elaboration functioned as a mediating variable, as suggested by conventional dual-process models (Kopfman et al., 1998). An independent t-test suggested that participants evaluated the non-narrative message ($M = 4.38, SD = 1.05$) more persuasive than the narrative message ($M = 4.02, SD = 1.02$), $t(206) = 2.49, p < .05$. As hypothesized by conventional dual-process models, issue involvement should interact with argument strength and influence the amount of cognition (Chaiken, 1980; Chen & Chaiken, 1999; Petty & Cacioppo, 1986). To test this hypothesis, a median split was conducted to categorize issue involvement into two categories: low stress involvement and high stress involvement. Three $2$ (narrative exposure) X $2$ (stress involvement) ANOVAs were performed on the number of counter-message thoughts, the number of pro-message thoughts, and the number of total thoughts. A main effect of stress involvement was found on the number of pro-message thoughts, $F(1, 170) = 6.48, p < .05$, partial $\eta^2 = .04$. Participants who reported high stress involvement ($M = 3.29, SE = .23$) generated more pro-message thoughts than participants who reported low stress involvement ($M = 2.20, SE = .36$). A main effect of narrative exposure was found on the number of counter-message thoughts, $F(1, 170) = 9.25, p < .01$, partial $\eta^2 = .05$. Participants
in narrative conditions ($M = .19, SE = .13$) generated significantly less counter-message thoughts than participants in non-narrative conditions ($M = .72, SE = .12$). However, no significant interaction effect was found on either type of cognition. In addition, no significant result was found on the total number of thoughts generated in participants’ responses. Therefore, the results revealed that the amount of cognitive elaboration was not found to be a potentially mediating mechanism of narrative persuasion in this study either.

Furthermore, health attitudes and behavioral intentions were regressed on narrative exposure, social support, sympathy, and frames that participants used to construct personal narratives. The analyses used frames of personal narratives rather than other attributes of personal narratives because, theoretically speaking, frames could be considered as interpretive packages that contain different attributes. Table 25 presents the results of the regression analysis. As the analysis showed, when considering all factors together rather than independent variables only, the use of the support frame to construct personal narratives ($\beta = .27, p < .05$) and sympathy ($\beta = .17, p = .06$) predicted more favorable attitudes towards maintaining sufficient sleep to deal with college stress. Furthermore, sympathy and attitudes positively predicted general behavioral intention (sympathy: $\beta = .12, p = .09$, attitudes: $\beta = .57, p < .001$), behavioral intentions to perform sleep strategies suggested by the main message (sympathy: $\beta = .21, p < .05$, attitudes: $\beta = .34, p < .001$), and behavioral intentions to perform sleep strategies suggested by the reply messages (sympathy: $\beta = .20, p < .05$, attitudes: $\beta = .18, p < .05$). Approaching statistical significance, the use of the internalization frame was positively related to intentions to perform sleep strategies suggested by the main message ($\beta = .15, p = .09$). In addition, narrative exposure was negatively related to intentions to perform sleep strategies suggested by the reply messages ($\beta = -.17, p < .05$). This result might be found because exposure to a narrative story reduces people’s memory of the information appeared in the messages after the narrative message.
Table 25. Predicting attitudes and behavioral intentions without controlling for perceived message persuasiveness.

<table>
<thead>
<tr>
<th></th>
<th>Attitude</th>
<th>General behavioral intention</th>
<th>Behavioral intentions to perform sleep strategies suggested by the main message</th>
<th>Behavioral intentions to perform sleep strategies suggested by the reply messages</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$\beta$</td>
<td>$\beta$</td>
<td>$\beta$</td>
<td>$\beta$</td>
</tr>
<tr>
<td>Narrative</td>
<td>-0.09</td>
<td>-0.05</td>
<td>-0.11</td>
<td>-0.17 *</td>
</tr>
<tr>
<td>(0 = non-narrative, 1 = narrative)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Emotional support</td>
<td>0.04</td>
<td>-0.02</td>
<td>-0.09</td>
<td>-0.06</td>
</tr>
<tr>
<td>(reference category: non-support)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-emotional support</td>
<td>-0.07</td>
<td>0.06</td>
<td>-0.14</td>
<td>-0.00</td>
</tr>
<tr>
<td>(reference category: non-support)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frames</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Reference category: message evaluations frame)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconstruction frame</td>
<td>0.15</td>
<td>0.00</td>
<td>0.16</td>
<td>0.05</td>
</tr>
<tr>
<td>Internalization frame</td>
<td>-0.04</td>
<td>0.05</td>
<td>0.15 †</td>
<td>0.01</td>
</tr>
<tr>
<td>Suffering frame</td>
<td>0.91</td>
<td>-0.08</td>
<td>0.17</td>
<td>0.01</td>
</tr>
<tr>
<td>Support frame</td>
<td>0.27 *</td>
<td>-0.01</td>
<td>0.15</td>
<td>-0.09</td>
</tr>
<tr>
<td>Sympathy</td>
<td>0.17 *</td>
<td>0.12 †</td>
<td>0.21 *</td>
<td>0.20 *</td>
</tr>
<tr>
<td>Attitude</td>
<td>-</td>
<td>0.57 †</td>
<td>0.34 ***</td>
<td>0.18 *</td>
</tr>
</tbody>
</table>

Note: *** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$

Model on attitudes: $F(8, 160) = 2.17$, $p < .05$, $R^2 = .10$.
Model on general behavioral intention: $F(9, 157) = 10.64$, $p < .001$, $R^2 = .38$.
Model on behavioral intentions to perform sleep strategies suggested by the main message: $F(9, 146) = 4.55$, $p < .001$, $R^2 = .22$.
Model on behavioral intentions to perform sleep strategies suggested by the reply messages: $F(9, 158) = 2.13$, $p < .05$, $R^2 = .11$.

Previous analyses suggested that perceived message persuasiveness varied as a function of narrative exposure (see methodology chapter). Another regression analysis was run with controlling for perceived persuasiveness. Table 26 presents the results of this model. Controlling for perceived
message persuasiveness did not make a significant difference on regression results. After controlling for perceived message persuasiveness, the results again showed that sympathy and attitudes were stable predictors of health persuasion outcomes (see Table 26).

Table 26. Predicting attitudes and behavioral intentions with controlling for perceived message persuasiveness.

<table>
<thead>
<tr>
<th></th>
<th>Attitudes</th>
<th>General behavioral intention</th>
<th>Behavioral intentions to perform sleep strategies suggested by the main message</th>
<th>Behavioral intentions to perform sleep strategies suggested by the reply messages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Narrative</td>
<td>β</td>
<td>β</td>
<td>β</td>
<td>β</td>
</tr>
<tr>
<td>(0 = non-narrative, 1 = narrative)</td>
<td>-0.04</td>
<td>-0.05</td>
<td>-0.05</td>
<td>-0.16†</td>
</tr>
<tr>
<td>Emotional support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(reference category: non-support)</td>
<td>0.06</td>
<td>-0.04</td>
<td>-0.09</td>
<td>-0.11</td>
</tr>
<tr>
<td>Non-emotional support</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(reference category: non-support)</td>
<td>-0.06</td>
<td>0.04</td>
<td>-0.14</td>
<td>-0.05</td>
</tr>
<tr>
<td>Perceived message persuasiveness</td>
<td>0.11</td>
<td>0.04</td>
<td>0.14 †</td>
<td>0.03</td>
</tr>
<tr>
<td>Frames</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Reference category: message evaluations frame)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reconstruction frame</td>
<td>0.16</td>
<td>-0.03</td>
<td>0.09</td>
<td>-0.02</td>
</tr>
<tr>
<td>Internalization frame</td>
<td>-0.04</td>
<td>0.06</td>
<td>0.16 †</td>
<td>-0.00</td>
</tr>
<tr>
<td>Suffering frame</td>
<td>0.03</td>
<td>-0.04</td>
<td>0.16</td>
<td>-0.00</td>
</tr>
<tr>
<td>Support frame</td>
<td>0.27 *</td>
<td>0.01</td>
<td>0.10</td>
<td>-0.13</td>
</tr>
<tr>
<td>Sympathy</td>
<td>0.11</td>
<td>0.09</td>
<td>0.20 *</td>
<td>0.22 *</td>
</tr>
<tr>
<td>Attitudes</td>
<td>-</td>
<td>0.61 ***</td>
<td>0.34 ***</td>
<td>0.20 *</td>
</tr>
</tbody>
</table>

Note: *** p < .001, ** p < .01, * p < .05, † p < .10
Model on attitudes: F(9, 151) = 2.21, p < .05, $R^2 = .12$.
Model on general behavioral intention: F(10, 148) = 10.29, p < .001, $R^2 = .41$.
Model on behavioral intentions to perform sleep strategies suggested by the main message: F(10, 138) = 4.63, p < .001, $R^2 = .25$.
Model on behavioral intentions to perform sleep strategies suggested by the reply messages: F(10, 149) = 2.10, p < .05, $R^2 = .12$. 
As the ANOVA and regression analyses suggest, sympathy varied as a function of the independent variables and was found to be a stable predictor of persuasion outcomes. Therefore, sympathy was examined for its role of a mediator. Bootstrapping procedures using 2000 bootstrap samples and bias-corrected confidence intervals were employed to test the mediating role of sympathy on the relationships between the narrative and support interaction and persuasion outcomes. In narrative conditions, approaching statistical significance, the results revealed indirect effects between non-emotional support and attitudes ($\beta = .09, p = .05$), between non-emotional support and general behavioral intention ($\beta = .08, p = .07$), and between non-emotional support and behavioral intentions to perform sleep strategies suggested by the main message ($\beta = .10, p = .05$), via sympathy. In non-narrative conditions, the analyses found four significant indirect effects between emotional support and intentions to perform sleep strategies suggested by the main message ($\beta = .26, p < .05$), between emotional support and intentions to perform sleep strategies suggested by the reply messages ($\beta = .46, p < .05$), non-emotional support and intentions to perform sleep strategies suggested by the main message ($\beta = .14, p < .05$), and between non-emotional support and intentions to perform sleep strategies suggested by the reply messages ($\beta = .24, p < .05$) via sympathy (see Figure 15).
Figure 15. Mediating role of sympathy.
The narrative group

The non-narrative group

Note: Dotted line indicates that path does not achieve statistical significance in the model.

*** $p < .001$, ** $p < .01$, * $p < .05$, † $p < .10$. 
Chapter 5

Discussion

Previous studies on online health support groups have suggested that the use of online health support groups could facilitate insightful disclosure, satisfy people’s desire of catharsis, create new meanings to explain the disturbing health experiences, reduce stress, and lead to positive changes in individuals’ psychological and physical health (Kim, 2009; Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006). However, little research has been conducted to examine how these positive changes have happened. Thus, the goal of this study was to examine how information in online health support groups is processed and how information processing could potentially be related the positive changes mentioned above. As scholars have identified, personal stories and empathic messages are the most prominent genres of messages in online health support groups (Preece, 1999; Preece & Ghozati, 2001). This study specifically investigated how people responded to these two types of messages and how these messages produced positive changes in individuals’ health attitudes and behavioral intentions.

Theoretical Implications

Revisiting theories of narrative persuasion

Narrative impact on persuasion. This study found that compared to non-narrative messages, participants who read narrative messages reported significantly fewer counter-arguments and greater sympathy. Compared to the control group, participants after narrative exposure also reported fewer counter-arguments and greater sympathy, although the difference did not achieve statistical significance. These findings were consistent with previous literature suggesting that narrative exposure could lead to greater persuasion by reducing counter-arguments (Slater & Rouner,
1996; Meng, 2009) and eliciting emotional responses that facilitate information processing (Dunlop, Wakefield & Kashima, 2008; Kopfman et al., 1998).

However, in this study, the superiority of narrative messages over non-narrative messages was not found in terms of eliciting greater attitudes and behavioral intentions to perform recommended behaviors. One explanation for this non-finding might result from the lack of perceived efficacy among participants. As many scholars have argued, attitudinal and behavioral changes are dependent on individual readiness towards the changes (Bandura, 2002; Slater & Rouner, 2002). In other words, whether the audience members feel capable of performing specific behaviors and whether they believe that the behaviors are effective to help them achieve their goals could make a difference on their attitudinal and behavioral changes after narrative exposure. In this study, maintaining sufficient sleep was the key recommended behavior to deal with college stress. However, it might be unrealistic and difficult to obtain sufficient amount of sleep for many participants who attended this study. For example, some people emphasized how busy finals week is in their personal narratives: “I completely know how you feel, as all college students can probably sympathize. The workload is very stressful. I know I balance classes, 4 club meetings, sports, and friends. Especially during finals week, sleep is the last priority because you are trying to get the most out of your day, and often there just aren’t enough hours.” Besides academic pressure, people also identified other obstacles that prevent them from performing the recommended behaviors: “I understand that sleep is important. However, I myself have never been able to articulate a healthy circadian rhythm.” These comments demonstrate the lack of perceived efficacy among many of this study’s participants, which would theoretically have a negative influence on their attitudinal and behavioral changes. Unfortunately, perceived self-efficacy and perceived response efficacy were not measured in this study. Future studies on the interaction of narrative exposure and perceived efficacy and its influence on changes in attitudes and behavioral intentions are warranted.
Narrative engagement in online health support groups. When explaining narrative impact on persuasion, many theorists have argued that narrative persuasion (i.e., reducing counter-arguments, eliciting greater emotional responses, and facilitating attitudinal and behavioral changes) happens through narrative engagement (Green & Brock, 2002; Slater & Rouner, 2002). The greater people identified with the media characters and were transported into the narrative world, the greater the positive changes they would demonstrate in their attitudes and behavioral intentions (Cohen, 2001; Green & Brock, 2000, 2002). This assertion was not supported in this study. First of all, identification and transportation were not successfully elicited after narrative exposure. Second of all, multiple group analyses suggested that the relationships between identification or transportation and persuasion outcomes were statistically identical between participants who read a narrative message and those who read a non-narrative message.

As argued in the literature review, there are many types of narratives, but whether a personal testimony told by an ordinary person in daily conversations has the same power with a drama is unknown. For online health support groups, stories shared by group users were not skillfully crafted. Therefore, the persuasive outcomes of these stories might be completely different from the outcomes of a drama. Even though the results suggested that participants in narrative conditions reported significantly greater sympathy than participants in non-narrative conditions, the means of reported emotional responses showed that emotional arousal was minimal in this study. As “vicariously experiencing the characters’ emotions” an essential component of narrative engagement (Slater & Rouner, 2002, p. 178), these results suggested that narrative engagement was low in this study, thereby making it difficult to argue that narrative engagement is the mechanism behind participants’ attitudinal and behavioral changes. Thus, it is arguable whether narrative engagement played a significant role in individuals’ processing of personal stories in online health support groups, as many narrative persuasion theorists have suggested in the past.
As participants perceived the non-narrative message to be significantly more persuasive than the narrative message, additional analyses were performed to examine whether information processing in online health support groups were supported by the conventional dual-process models. In other words, statistical analyses were performed to examine whether the perceived strength of the experimental messages interacted with stress involvement and led to greater amount of cognitive elaboration. These analyses found a main effect for stress involvement on the number of pro-message thoughts and a main effect for narrative exposure on the number of counter-message thoughts that participants generated. However, no significant interaction effect was found on either type of cognition. In addition, as the conventional dual-process models argues, the systematic processing of messages should lead to the increase of both pro-message and counter-message thoughts. However, as summarized before, changes in these two types of cognition were caused by different factors in this study. No significant result was found on the total number of thoughts either. Therefore, the conventional dual-process models, which believes cognitive elaboration as a key mediating mechanism for information processing and persuasion, was not supported in this study either.

**Participants’ narratives as one mediating mechanism.** As summarized before, in this study, neither narrative engagement nor cognitive elaboration mediated individuals’ processing of personal stories in online health support groups. Instead, this study found that narrative exposure significantly influenced how participants formed their own responses to share with other users in online health support groups. Specifically, narrative exposure influenced the emotional status (i.e., positive versus negative outlook) that participants used to end their written responses. The results suggested that a greater percentage of participants in narrative conditions chose to end their own narratives with the most positive outlook while a greater percentage of participants in non-narrative conditions chose to end their own narratives with the most negative outlook. In addition, the analyses also found that
after being exposed to a narrative story, a greater percentage of participants used the support frame to organize their responses. Meanwhile, the percentage of participants who used the message evaluations frame to organize their written responses was significantly lower in narrative conditions than in non-narrative conditions. Narrative exposure also made participants elaborate less about their innermost feelings but demonstrated greater transformation in their written responses. In particular, a greater percentage of participants chose to end their responses in a transformation mode in narrative conditions than in non-narrative conditions. Compared to the narrative mode that was used at the start of the personal narrative, a greater percentage of participants demonstrated narrative progress in narrative conditions.

These results suggest that the type of cognition, rather than the amount of cognition, might be a key mechanism that mediates processing of personal stories in online health support groups. As argued in the methodology and results chapters, personal narratives using the support frame refer to written responses that aim to provide third-person support. Different from participants who selected the reconstruction frame, the authors using the support frame did not disclose a great deal of personal experiences. Rather, they focused on providing empathy and suggestions to help other individuals find solutions to deal with college stress. Therefore, it was not surprising that the transformation narrative mode dominated this type of written responses. Although, participants did not disclose their personal information very often, when they provided support, they thought through the situation and generated solutions to the health problem. To conclude, exposure to personal stories in online health support groups could encourage users to think about a problem actively and to find solutions when forming responses using the support frame. Therefore, a promising result regarding the use of online health support groups was suggested.

**Forms of narratives and persuasion effects.** As stated previously in this paper, the current study examined persuasion effects of a particular form of narratives: the personal testimonial.
Different from dramas which are more effective to create the transportation experiences and to elicit audience members’ emotional experiences, this study suggested that the participants were failed to be transported into the narrative world after exposure to personal stories in online health support groups. However, it does not necessarily mean that drama is more effective than the personal testimonial in communicating health information.

Due to the influence of cognitive capacity, the relationships between narrative exposure and positive persuasion outcomes might be curvilinear. Studies have revealed that people learn better under moderate rather than high levels of arousal (Lang, Bolls, Potter & Kawahara, 1999; Sanbonmatsu & Kardes, 1988). In other words, when the drama is too powerful, audiences may be distracted and absorbed into the narrative without getting the educational messages and therefore may not demonstrate changes in health attitudes and behavioral intentions. Therefore, less powerful forms of narratives could be more effective to communicate educational messages such as health information. Personal testimonials in online health support groups could be considered to be a less powerful form of narratives. Personal accounts of life experiences usually are not presented at high paces or do not contain high arousal content, which are believed to be able to result in better information recall than high arousal television messages. Findings of this study suggest the positive impact of exposure to the personal stories in online health support groups, including selecting the support frame to form a written response and reporting greater sympathy that are related to changes in attitudes and behavioral intentions. However, information recall was unfortunately not measured in the current study. Future studies to investigate the effectiveness of personal testimonial versus drama on information recall are warranted.

Revisiting social support theories

As suggested by previous literature, this study found that perceived emotional support varied as a function of observed social support. Participants reported the highest level of perceived
emotional support in emotional support conditions followed by participants in non-emotional support and non-support conditions (Burleson & Mortenson, 2003; Cappella & Klein, 2006; Kunkel & Burleson, 1999; Jones, 2004; Jones & Gerrero, 2001). However, recent studies suggested that the statistical difference should not only be found between participants in emotional support and non-support conditions but that the statistical difference should also be found between emotional and non-emotional support conditions (Burleson, 2009). The former assumption was supported in the study, while the second one was not. In addition, this study found that whether participants decided to write a response in the online health support group or not did not vary as a function of observed social support either.

To explain this finding, it is important to recognize that few previous studies on online health support groups have manipulated supportive messages to examine people’s responses. Therefore, no empirical evidence has been found to support the argument that people who read sensitive supportive messages would report statistically greater perceived emotional support than people who read insensitive supportive messages in the context of online health support groups. In previous studies, people responded to open-ended questions stating that that one disadvantage of online health support groups was that people could come across insensitive support when using it (Wright, 2002). People who reported that they were sensitive to these hurtful remarks might have special characteristics. As previous studies have suggested, individual differences, such as attachment style, might moderate individuals’ responses to different types of supportive messages (Lemieux & Tighe, 2004). For this study, most participants were not regular online health support group users and were not prepared to use online health support groups in the future either. Therefore, they may not have taken the insensitive supportive messages that they encountered as being hurtful as compared to actual online support group users. By the same logic, the sensitive supportive
messages might not have changed participants’ preexisting attitudes towards online health support groups either.

However, these results do not necessarily mean that participants were not sensitive to existing supportive interactions. Rather, the study found the amount of self-disclosure and how participants organized their personal narratives varied as a function of observed social support. Specifically, this study found that participants in non-support conditions disclosed significantly more personal information than participants in non-emotional support conditions. In addition, a greater percentage of participants in non-support conditions shared their personal experiences of college stress than participants in non-emotional support conditions. More importantly, participants observing different levels of social support organized their responses using different frames. A significantly lower percentage of participants in non-emotional support conditions used the suffering frame than participants in non-support conditions. As mentioned before, the use of the suffering frame refers to organizing a personal narrative by complaining about college stress and revealing negative feelings associated with college stress. As suggested by the analysis on frame use and associated interpretive packages, this finding about the lower adoption rate of the suffering frame was consistent with another finding of this study, which suggested that participants in non-emotional support conditions disclosed significantly less personal information and were less willing to share their stressful experiences as compared to participants in emotional support conditions. All of these results together reveal that observed non-emotional support somehow inhibits individuals to disclose personal information.

Interestingly, a significant difference in the ways individuals form personal narratives was mainly found between participants in non-emotional support and non-support conditions. In other words, emotional supportive messages were not empirically found to be superior in terms of guiding participants to produce the ideal personal narrative for positive changes in their health attitudes and
behavioral intentions. For example, the amount of disclosed personal information was positively related to persuasion outcomes, such as the number of pro-message thoughts generated in participant’s narrative. However, participants disclosed more personal information in non-support conditions than in emotional support conditions. This puzzling finding might be explained together with another finding that a greater percentage of participants in emotional support and non-emotional support conditions were found to use the support frame as compared to those in the non-support conditions. Clearly, the second finding demonstrated a framing effect that what people observed guided how they thought they should respond to a situation. As participants in non-support conditions did not observe any reply messages suggesting empathy or offering advice to deal with college stress, they did not form their responses to support others. As a consequence, participants in non-support conditions focused on sharing personal stress experiences and disclosing more personal qualities. Therefore, the puzzle mentioned before is solved.

Moreover, approaching statistical significance, social support also led to variance in the variety of counter-arguments generated in participants’ narratives. When participants observed higher levels of support, they generated less variety of counter-arguments in personal narratives. In summary, as an early attempt to implicate offline support theories into online health support groups, these results together suggest that people are sensitive to existing supportive interactions in online health support groups, as previous studies have suggested (Antaki, Barnes & Leudar, 2005; Cho, 2007). More importantly, this study found that observed social support significantly influenced how people organized their written responses in online health support groups. As previous studies on online health support groups have shown, insensitive support (i.e., non-emotional support) provoked message reactance, such as a greater variety of counter-arguments, and less willingness to share personal information, such as less disclosure of personal qualities (Wright, 2000b, 2002).
As this study is one of the first studies to examine individuals’ responses to messages in online health support groups, it is important to recognize the difficulty of manipulating different types of supportive messages. Although many studies on online health support groups have categorized messages using different functions, such as empathy sharing, information sharing, personal stories, and so forth (Coulson, Buchanan, & Aubeeluck, 2007; Preece, 1999), a close look at actual messages in online health support groups reveals that online health support group messages usually use a hybrid format, meaning that the same message can serve multiple functions. For example, it would not be surprising to read a message that serves to disclose an individual’s own experiences and provide support to others at the same time. To maintain the external validity of this study, the supportive messages were manipulated by imitating actual messages from online health support groups. Emotional supportive messages in this study were operationalized as empathy sharing. More specifically, to reply to original posts with empathy, the reply post author used encouraging remarks, such as “you are not alone” and “we are all behind you to support you,” and identified with the author of the original post by admitting that college stress has happened to him/her as well. Besides sharing empathy, the author also provided advice to deal with college stress. Therefore, the hybrid emotional supportive messages served the functions of giving advice and sharing empathy simultaneously. Non-emotional supportive messages provided the same advice that emotional supportive messages provided to the author of the original post. However, to distinguish them from emotional supportive messages, non-emotional supportive messages did not aim to provide empathy. Therefore, stress identification and encouraging remarks were not presented in non-emotional supportive messages. The support providers gave advice based on what they believed to be important for solving the problem. These suggestions might have been based on their personal experiences, but the experiences were not disclosed in the supportive texts. In addition, to make non-emotional supportive messages the same length as emotional supportive messages in this study,
additional web links were provided in non-emotional supportive messages. These web links were provided to create the perception that non-emotional supportive messages focused on providing information. However, to ensure that participants in emotional and non-emotional support conditions were exposed to the same advice, these web links were created as jpg images rather than active hyperlinks. Since actual messages in online health support groups often employ a hybrid form, it is important to know that emotional and non-emotional supportive messages manipulated in this study were not made up of exclusively independent genres of social support. That’s also the reason why the conditions in this study were not distinguished as emotional versus informational versus non-support. Since the two types of supportive messages used in this study overlapped somehow and did not show a white and black contrast with each other, some ambiguous results were found. For example, the non-finding on statistical difference on perceived emotional support between emotional and non-emotional support conditions might be resulted due to this reason.

**Interaction effects of narrative exposure and social support**

Interaction effects of narrative persuasion and social support were found on perceived emotional support, sympathy, and variety of counter-arguments generated in participants’ narratives. Interestingly, these three interaction effects demonstrated a similar pattern: observed social support did not make a difference on the dependent variables if participants read a narrative message. However, if participants were exposed to a non-narrative message, linear relationships were found: the greater social support that participants observed, the greater pro-persuasion outcomes they reported, including greater perceived emotional support, greater sympathy, and less variety of counter-arguments.

Previously, an expectancy gap leading to greater message reactance in the narrative/non-emotional support condition and the narrative/non-support condition was anticipated. In other words, it was previously thought that observed social support would make a difference in persuasion
outcomes in narrative conditions. Comparatively, it was also anticipated that observed social support would not make a different in non-narrative conditions. The reason for this speculation is that for people who intend to use online health support groups, it can be intimidating and even hurtful if they find that people who share similar needs are treated insensitively or ignored. In particular, the disclosure of one’s own experience is a gesture of trust and help-seeking. If people who disclose their experiences are treated rudely, other group users who planned to do the same thing would feel especially discouraged.

However, the findings in this study were contrary to this speculation. The results indicated several possibilities. First, most of the participants in this study were not actual online health support group users. Although this study tried to create an environment to examine the responses of hypothetical first-time online health support group users, it is important to note that participants in this study did not personally initiate support-seeking through the use of online health support groups. Therefore, it is highly possible that they did not perceive there to be a huge expectancy gap in the narrative/non-emotional support and the narrative/non-support conditions, which should theoretically arouse message reactance. Second, it is possible that participants were more attentive to the main message in narrative conditions, while participants in non-narrative conditions might be more attentive to the reply messages. Therefore, participants were more sensitive to social support in non-narrative conditions than in narrative conditions. Previous studies have suggested that people remember narrative information better (Zillmann, 2002). Following this logic, the narrative message (the main message) might be more salient in participants’ memories than the supportive messages (the reply messages) in narrative conditions. For participants in non-narrative conditions, because the reply messages were shorter than the main message, it was reasonable to believe that participants paid more attention to the reply messages, therefore demonstrating greater emotional and cognitive responses to the reply messages. However, information recall measures should be used to test this
speculation, which was beyond the limits of the current study. Third, another explanation of this finding might be associated with the specific form of narratives examined in current study. As illustrated before, this study investigated persuasion effects of personal testimonials. Although considered as a form of narratives, personal testimonials are first-person accounts of life experiences which may be not as powerful as dramas in terms of persuasion. The statistical analyses suggest that people were failed to be transported into the narrative world in the current study. Therefore, although they might pay attention to the narrative story, they did not vicariously experience the feelings of the author of the original post. As a consequence, cognitive and emotional responses associated with the expectancy gap the author of the original post was supposed to experience were not experienced by the participants.

**Changes in health attitudes and behavioral intentions**

Numerous studies have identified important predictors of health attitudes and behavioral intentions. In particular, cognition is an important predictor of health attitudes (Eagly & Chaiken, 1993). Furthermore, attitudes, social norms, efficacy and strong individual emotions, such as fear and anger, predict behavioral intentions (Ajzen & Fishbein, 1980; Ajzen, 1991; 2002; Dillard & Shen, 2005; Fishbein & Ajzen, 1975; Witte & Allen, 2000). This study confirmed previous studies’ findings related to the strength of attitudes when predicting behavioral intentions. However, it is important to recognize that previous studies on online health support groups mostly focused on investigating the impact that using such support groups had on psychological and physical well-being (Shaw, Hawkins, McTavish, Pingree & Gustafson, 2006). Little research has been conducted to examine the impact that using such support groups has on attitudinal and behavioral changes.

**Narratives as a behavioral medicine.** Narrative psychotherapy suggests that the interactions between therapists and clients could effectively guide clients to form meaningful narratives. As a result, meaningful narratives could help clients recognize memories that might be unconsciously
unforgotten and inhibited before and could help them reduce the negative emotions and confusion associated with the inhibition, while re-creating new meanings for their disturbing experiences. In the long run, forming narratives for disturbing experiences are associated with better psychological and physical well-being. This power of narratives as a behavioral medicine has been recognized by many scholars in different disciplines (Angus & Hardtke, 1994; Angus, Lewin & Hardtke, 1996; Angus, Levitt & Hardtke, 1999; Angus, Lewin, Bouffard & Rotondi-Trevisan, 2004; Gray, 2009, Graybeal, Sexton & Pennebaker, 2002; Pennebaker & Seagal, 1999).

Besides merely examining the psychological and physical well-being resulting from releasing negative feelings through forming narratives, this study speculated that forming narratives to look for new meaning will make narrators experience cognitive changes and will result in changes in attitudes and behaviors intentions for better health outcomes. This speculation was supported by results of some explanatory analyses. For example, participants who used the transformation mode more frequently to form personal narratives reported more favorable attitudes and greater intentions to perform sleep strategies suggested by the main experimental message and the reply messages. In addition, participants using the support frame to organize their written responses reported significantly more favorable attitudes and greater behavioral intentions to maintain sufficient sleep to deal with college stress. Even when controlling for the effects of other predictors in the regression model, the use of the support frame still significantly predicted more favorable attitudes. This finding is promising, as it shows that online health support group participation is a reciprocal practice. Not only do people provide support to others, but during the process of providing written support, they also receive benefits themselves and demonstrate cognitive changes that lead to positive attitudinal changes.

**Sympathy.** This study also found sympathy to be a stable positive predictor of attitudes and behavioral intentions. Compared to other emotions, such as fear and anger, sympathy has been
studied less frequently in health persuasion research. De Rosis, Novielli, Carofiglio, Cavalluzzi, and De Carolis (2006) argued that different from fear, anger, and joy, which are characterized as individual emotions, sympathy is a social emotion that stems from interactions with other people. In a study examining human-computer interactions on health issues, these authors found that sympathy was an important predictor of involvement in human-computer conversations about health issues (De Rosis et al., 2006).

In a previous section of this chapter, it was discussed that narrative engagement did not mediate the relationship between narrative exposure and persuasion, and an explanation was provided for this finding: namely, it was argued that personal testimonials of life experiences that are shared in online health support groups will not be as powerful as dramas, which immediately invite audience members to immerse themselves into the narrative world. In the context of online health support groups, however, this study found that sympathy varied as a function of narrative exposure and observed social support. As suggested by previous literature, sympathy may partially indicate participants’ engagement in narrative persuasion (De Rosis et al., 2006; Smith, 1998). Sympathy is an emotional response after stimulating self into the situations of empathic others. As a self-referent emotion, it could direct changes in attitudes and behavioral relations (Dunlop et al., 2008). The finding of this study has confirmed with the role of sympathy in influencing health attitudes and behavioral intentions.

Practical implications are associated with this finding. In the context of online health support groups, sympathy is an emotion that is easy to elicit. Furthermore, sympathy may also increase participation. When people feel sympathetic, they might want to participate in an online social support groups. Even though sometimes they do not want to disclose their own experiences, as human beings, individuals tend to provide support to others when they feel sympathetic. As discussed before, people could experience cognitive changes and develop solutions to their own
problems even when they just want to provide support for others. Also, people who report greater sympathy may not critically evaluate the messages they read. Therefore, in this study, it is highly possible that such individuals generated less message reactance and were more willing to follow the messages’ suggestions. Consequently, they showed more favorable attitudes and greater behavioral intentions to undertake healthier behaviors. Since sympathy is such an easily elicited social emotion in the context of online health support groups, this finding indirectly demonstrated the potential of online health support groups for health promotion.

**Special concerns in online health support groups**

Slater and Rouner (2002) proposed that narrative exposure would encourage interpersonal discussion, which served as a rehearsal that facilitated attitudinal and behavioral changes. In the context of online health support groups, interpersonal discussion could include writing responses to existing supportive interactions to participate in a group discussion. As reviewed before in this chapter, the rehearsal effect of interpersonal discussion was supported in this study; that is, narrative exposure and observed social support influenced how participants organized their responses, such as selecting different frames, using different narrative modes, controlling the amount of intimate and personal information in self-disclosure, and so forth. More importantly, these attributes of personal narratives were empirically related to persuasion outcomes. However, narrative exposure was not found to be related to greater willingness to participate in the online health group. In other words, the study did not find a greater percentage of participants in narrative conditions to write a voluntary response than in non-narrative conditions. This finding should be interpreted along with weak tie network concerns.

This study suggested that although most people were willing to help others by providing support and generating a personal response to participate in online health support groups, weak tie network concerns still existed. As demonstrated in the results chapter, weak tie network concerns
were common, including perceived vulnerability (i.e., the fear of getting hurt as a result of writing a personal response and disclosing personal information) and perceived security concern (i.e., the worry that personal information disclosed in online health support groups would be misused by third parties, advertisers and so forth). Interestingly, the perceived security concern was significantly higher in narrative conditions than in non-narrative conditions. This result indicated that to witness others disclosing personal information increased individual’s concern that the personal information they disclose in the group would be misused by agencies or people. This, in turn, may inhibit people from disclosing their own information and participating in online health support groups. This hypothetical relationship was supported in this study, as participants who voluntarily wrote a response in the online health support group demonstrated significantly lower perceived security concern than the participants who refused to disclose any information.

Analyses were performed to examine what factors influenced the perceived security concern. More specifically, correlation analyses were performed to examine whether motivations to seek meaningful interpersonal relationships using the Internet and whether the experience of using online health support groups before could alleviate the perceived security concern. Presumably, if people are accustomed to using online health support groups in their daily lives, the perceived security concern preventing them from participation might be reduced. However, except for narrative exposure, the perceived security concern was not associated with any other factor, including previous experiences with using online health support groups. Interestingly, the perceived security concern was positively related to perceived emotional and informational support. This finding suggest that individuals’ perceptions of the risk that their personal information might be misused did not block their beliefs that if they disclosed their personal information, they would still receive empathy and advice from other users of the online health support group. This finding might explain why perceived supportiveness did not influence voluntary participation in the online health support group. Although
people may have sensed that they would be supported, they still may have decided not to disclose information about themselves as a consequence of being afraid of malevolent agencies and people misusing their personal information.

The impact of perceived security concerns was identified in previous literature as one major challenge of e-health (Levy & Strombeck, 2002). However, this factor has rarely been examined in research related to online health support groups. More often, encountering hostile messages in online health support groups was considered to be a more significant risk that would diminish group participation (Wright, 2000a). In the current study, perceived vulnerability due to encountering insensitive supportive interactions represented the perceived risk of encountering hostile messages. Consistent with previous literature, perceived vulnerability was found to be sensitive to existing supportive interactions. Increases in this perception made people select the message evaluations frame more frequently than the reconstruction frame when forming written responses. However, besides perceived vulnerability, as the above discussion illustrates, this study reveals the importance of examining the role of perceived security concerns. Previous studies on online health support groups have rarely addressed perceived security concerns. Thus, it is important to know that perceived security concerns were uniquely provoked in participants when they read personal stories rather than supportive messages. Scholars have found that using e-forums for health information sharing was inhibiting because of individuals’ concerns that third parties and advertisers would manipulate consumers by using their personal health information people disclosed on the Internet (Miyazaki, Stanaland & Lwin, 2009). The emphasis on perceived security concerns as an important risk of Internet use is consistent with increasing debates about developing strategies to protect the privacy and confidentiality of personal health information online (Levy & Strombeck, 2002). As such, more studies should be conducted to examine the precedents and consequences of perceived
security concerns. Studies in this area would have implications for medical literacy, Internet literacy, legislation, and more.

**Practical implications**

**Online health support groups**

The ultimate goal of this study was to identify the benefits of using online health support groups for attitudinal and behavioral changes and to investigate the potential effects of using online health support groups in daily life and in health campaigns. This study found that online health support groups could effectively guide people to organize their health experiences. Writing down related thoughts seemed to be an effective way for writers to reflect on their own experiences and figure out solutions to the problems presented in the online groups. This study found that after exposure to other’s personal stories and supportive messages, users of online health support groups could learn to examine their own problems and undergo cognitive changes by re-constructing their own experiences and providing support to others. This finding demonstrates that online health support group participation might be especially beneficial to patients who are diagnosed with chronic diseases, such as cancer and diabetes, or people who need to combat an addiction with long-term behavioral changes, such as quitting smoking. For people who are diagnosed with chronic illnesses or need to undergo long-term behavioral changes, there are always good and bad days. As such, their problems may relapse and they may feel more negative some days than others. Similarly, some days, they may feel a strong desire to change their behaviors to achieve more positive health outcomes, whether it is increasing exercise or quitting smoking, but on other days, they may find it more difficult to perform the improved behaviors. Regular participation in online health support groups, however, is promising to help solve these problems. Participation could help these people restore
their confidence on cloudy days and, as the findings showed, remind them of positive solutions when they provide support to other people.

Besides the received benefits, this study found that perceived security concerns and perceived vulnerability inhibited specific online health support group participation. These concerns indicate the increasing need for online health support group regulations. For online health support group users, hurtful remarks from others and concerns that third party agencies and advertisers might misuse their personal information might make them less likely to disclose their feelings again. As revealed in previous studies, inhibition might result in negative psychological and physical consequences (Graybeal, Sexton, & Pennebaker, 2002; Pennebaker & Bell, 1986).

Based on these findings, it is possible to include online health support groups as a component of community health campaigns. On the one hand, the true stories that people share in online health support groups about overcoming health challenges could be used to establish culturally appropriate role models. As this study found, these real stories could guide community members to re-construct their own experiences. Even though some participants do not want to disclose their own stories due to concerns of perceived security, participation in online health support groups, including reading others’ stories and providing support to others, could urge users to think actively about a specific health issue and could help them figure out solutions to their own problems.

Second, as previous studies have suggested, the loneliness an individual feels due to a chronic illness could be reduced by using online health support groups (Wright, 2000b). This medium has the potential to provide long-term company to patients with chronic illnesses. More importantly, as this study found, participation in these health groups could also cause positive changes in individuals’ health attitudes and behavior intentions, both of which are important benefits of online health support group participation. As argued before, whether people think they partake in a specific health behavior one time versus whether they think they can maintain that behavior for a long time is
different. The online health support groups used in health campaigns can be considered long-term health interventions. For users, online health support group provide them with a medium for learning and imitation and for catharsis and behavior monitoring. All of these activities will not happen in the hierarchical physician-patient relationship or between patients and non-patient family or friends who lack a mutual understanding of each other. Rather, learning, catharsis, and monitoring would happen among a group of people who share the same health interests and problems. Therefore, online health support group participation might be related to increasing collective efficacy, which will, in turn, influence self-efficacy and long-term behavioral change.

**Health promotion for stress management and sleep**

This study advised college students to maintain sufficient sleep to manage college stress. Surprisingly, it was found that more than a few participants indicated that it was difficult to perform the recommended behavior in their written responses. In other words, the recommended behaviors seemed to be associated with low self-efficacy, which in this study, was represented by students feeling that 1) they could not maintain sufficient sleep because of their work load and other activities and 2) they could not control their biological clocks to maintain healthy sleep patterns. These findings provided insight into the challenges of promoting sufficient sleep in public health practices. As many college health issues are interrelated, this study introduced sleep as an effective strategy to deal with stress. It seemed that the same strategy could be used to promote sleep. To respond to the challenges that students identified related to maintaining sufficient sleep, time management strategies might be provided concurrently in health campaigns that promote sleep.

Besides perceived self-efficacy, previous health practices identified that sleep was hard to promote because of low perceived severity among people. In other words, people do not feel like it is a serious problem if they do not get sufficient sleep occasionally. It is possible that individuals’ perceptions of the word “occasionally” also explained the lack of perceived efficacy in the current
study. After reading the experimental stimulus depicting a person suffering from college stress during finals week, participants may have felt that sleep would never be considered a priority during finals weeks. Also, they may feel that a lack of sleep only during this period will not result in serious consequences. These speculations suggest that future health promotions on sleep should emphasize the long-term consequences of occasional lack of sleep. Otherwise, counter-arguments, low perceived efficacy, and low perceived severity would be easy to be generated.

**Limitations**

Previous studies on online health support groups usually adopted survey and interview methodologies and asked users to self-report their psychological and physical well-being after using such groups. Little research has been conducted to explore explanatory mechanisms behind the positive changes online health support groups have on psychological and physical well-being. Using an experimental design, this study examined how participants responded to two major types of messages in online health support groups. Importantly, the study found that guided written responses to participate in online health support groups helped people reconstruct their negative health experiences, which led to changes in attitudes and behavioral intentions. Despite the significant findings and innovative design for studying participants’ information processing of messages in online health support groups, this study has several limitations.

First, 74.7% of participants in this study claimed that they had never participated in online support groups before. Therefore, the findings of this study can only be generalized to first-time users of online health support groups. It is unknown whether a sample dominated by regular users of online health support groups would generate the same cognitive and affective responses to the two types of messages in online health support groups or not. In addition, although college students identified college stress as a high involvement issue, they may not consider seeking help from online health support groups as a primary solution. Many participants indicated in their written responses
that they can easily reduce stress by spending time with family and friends, and some also ridiculed participating in online health support groups to seek solutions for stress as merely being a waste of time. These reactions can be easily understood among a group of people with low motivations to use online health support groups. Further, some untold reactions resulted in non-random missing data in participants’ narratives and created difficulties to examine how participants’ narratives mediated the relationships between message exposure and changes in attitudes and behavioral intentions. People who are highly motivated to use online health support groups, such as people who are diagnosed with certain diseases, may demonstrate different reactions, such as being more sensitive to existing interactions and more willing to share personal information when forming their own responses.

Second, as discussed at the end of the methodology chapter, a multiple health topics design rather than a single topic design should be employed in this study to examine how people process messages in online health support groups and how online health support group use could help them organize their health experiences. It should be noted that online health support groups could be used to help people manage a variety of health experiences, including dealing with stigmatized illnesses, such as breast cancer, substance abuse, and AIDS; dealing with chronic diseases, such as diabetes and back pain; and regulating long-term behavioral changes, such as quitting smoking. The findings of this study, including the reported sympathy after exposure to personal stories and social support in online health support groups, are currently restricted to the health issues examined in this study only. As such, the benefits of online health support group use should be demonstrated with a variety of other health issues. Future studies examining the effects of online health support group use on managing health experiences for a variety of health issues are warranted.

Third, the interaction between narrative exposure and efficacy was not modeled in this study to examine interaction effects on attitudinal and behavioral intention change. As discussed before, based on participant’s responses, efficacy perceptions might be extremely important in promoting
sleep to deal with college stress. Therefore, the lack of variance in attitudes and behavioral intentions after message exposure may have been partially resulted from the lack of efficacy, including students’ lacks of beliefs that sleep could effectively reduce stress and their beliefs that it is hard to maintain sufficient amounts of quality sleep. A related weakness of this study is that changes in behavioral intentions were examined rather than actual behaviors. It might be more valuable to measure behavioral changes to expand the promising effects of online health support group use found in the current study. However, as the theory of planned behavior suggests, changes in behaviors usually correlate with strong efficacy perceptions (Ajzen, 1991, 2002a). Thus, future studies exploring the interaction effects of efficacy and message exposure on behavioral intentions and behaviors are warranted.

Future studies

The results of the current study suggest a number of interesting directions for future research. First of all, more studies need to be conducted on efficacy and its impact on attitudinal and behavioral changes. This study suggests that online health support groups are promising mediums to guide participants to generate particular cognitions that help them organize their experiences and produce positive changes in their attitudes and behavioral intentions. However, whether online health support group use could alter efficacy perceptions is unknown. Research in narrative persuasion has found that by witnessing the success of role models performing certain behaviors and the resulting rewards, observers will sense greater efficacy (Smith, Downs & Witte, 2006). This relationship should be examined further in studies on online health support groups. For many of the health problems that people feel less efficacious about overcoming and for which it is difficult to find role models in their daily lives, online health support groups could easily provide these individuals with opportunities for observational learning. Plus, people may find it easier to communicate with other users in the support group, as they share the same issues. As discussed before, for patients diagnosed
with chronic illnesses, online health support group use could influence collective efficacy, which could then influence self-efficacy. This process needs further consideration in future research.

Furthermore, perceived security concerns should be independently studied as a risk of participating in online health support groups. Previous literature has identified perceived security concerns as challenges to the increasing use of the Internet for health communication. How much perceived security concerns influence online health support group participation and what factors could influence perceived security concerns in e-health should be studied further. In many online health support groups, users see medicine advertisements on the web pages, for example. Whether these contextual cues affect perceived security concerns and consequently influence online health support group participation should be examined. Longitudinal studies on cognitive and affective responses and attitudinal and behavioral changes after using online health support groups should be conducted.

Previous studies using longitudinal designs have examined the impacts of online health support groups on psychological and physical changes. This study showed that online health support groups could also be potentially used to change people’s health behaviors. Thus, longitudinal studies should be conducted to explore whether frequent participation in the online health support groups for a period of time could be positively related to lasting behavioral changes. As argued before, studies like this may be especially useful to examine behavioral changes among people diagnosed with chronic diseases, such as diabetes, or people planning to perform long-term behavioral changes, such as quitting smoking. Longitudinal studies could also investigate whether and how people’s attitudes could change with online health support participation especially among people who demonstrated reactance initially.
Conclusion

This study examined how hypothetical first-time users would respond to messages in an online support group about college stress. The study found that exposure to personal stories and observations about how other people provide support would influence people to generate their own written responses to participate in the online health support groups. Among the variety of personal responses generated by the participants, the use of the support frame was positively related to being more positive when looking at one’s health issues and figuring out solutions to solve one’s health problems. More importantly, providing support was a reciprocal practice, as it did not only contain suggestions and solutions for others but also lead to positive attitudinal changes among the participants themselves. Furthermore, many attributes of personal narratives were related to positive persuasion outcomes. This study also found that sympathy could be elicited after exposures to personal stories and supportive messages in online health support groups. As found in this study, sympathy directed positive changes in health attitudes and behavioral intentions. Since sympathy is such an easily elicited emotional response when using such groups, this study demonstrated the potential value of using online health support groups to help people manage users’ health experiences in daily life and through health campaigns.
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*Interacting with Computers, 12,* 63 – 77.


Appendix A. Example image of web pages of the online health support group.
Appendix B. Experimental stimuli.

Main message: Narrative message:

How to Reduce Stress While in College
November 13, 2009 – 10:17 am by Sarah G

This is my first year in college. I love college, but it is absolutely crazy. First midterms passed, way too many classes, and I did not get the grades I expected. I remembered I studied the whole night before one exam, but was too tired and fell asleep during the exam the next day. And now, finals are coming. I am studying harder and really don’t want my first semester of college life to be a failure. But everything is just so overwhelming.

Besides academic work, there are also a lot of others things I have to do: social, romantic, extracurricular activities, etc. I sometimes drink a dozen cups of coffee in order to remain alert throughout the long day. Then my heart rate goes so fast and it seems like it will jump out of my chest within the next minute. I usually don’t have sufficient sleep these days, don’t have a good appetite, always feel nauseous, have headaches, and get angry easily.

Life seems impossible. Someone I know tried Adderall, the drug prescribed for people diagnosed with attention-deficit hyperactivity disorder. He got some pills from another friend with the prescription. The drug enabled him to remain focus and study all night before exams. I was shocked. This is what we called “substance abuse”? I do NOT want to do this. But I have no idea what I should do.

Bright side:
I caught a cold several days ago and went to the university health services. It was interesting because one of the very first questions the doctor asked was “Are you feeling stressed?” She told me it was critical to maintain a sufficient amount of sleep to reduce stress. People under stress for a long time experience physiological and psychological tensions that often lead to mental and physical exhaustion and illness. Sleep can help people return to a relaxed state and balance the negative influences that stress may cause in your life, from immune system to mental activity.

But the fact is I usually don’t have enough sleep. I got more sleep during these days when I was sick. It is interesting that being sick actually refreshed me. I usually thought before that if I did not do work and was behind once, then everything will fall behind. I, thus, always over-schedule and feel extremely stressed. But it turns out things were not so bad. Now, I am feeling much better. The amount of work and stress level did not soar crazily as I expected either. I guess I still worry about finals, but I feel less stressed after getting some sleep and more efficient when I study.

Here are some tips for quality sleep my doctor provided. Hope they help.
- Keep the bedroom dark, quiet, comfortable, and at a proper temperature
- Get regular exercise each day but complete your exercise at least a few hours before bedtime
- Don’t have a big meal before going to bed
- Don’t consume caffeine such as coffee, tea, soft drinks, and chocolate close to bedtime
- Don’t consume nicotine including cigarettes or tobacco products close to bedtime
- Don’t watch television, and engage in stimulating activity in the bedroom

Main message: Non-narrative message:

**How to Reduce Stress While in College**

November 13, 2009 – 10:17 am by Sarah G

At any given point in time, most college students are stressed about something. Some people argue that the first and second years of college students are more likely to be stressful due to the changes in life – separation from family, heavy course loads, sharing dorms with others, changes in eating and sleeping habits, financial pressure of starting to live on your own, and so forth. However, juniors and seniors are also stressed since they begin to worry about their career prospects in addition to having the same concerns the freshmen and sophomore students have, such as financial pressure, romantic issues and courses and grades. It is just part of going to school. While having stress in your life is normal and often unavoidable, being stressed is something you can control.

Being in college means you have a lot on your plate – academic, social, romantic, extracurricular activities, etc. When it comes to balancing busy schedules, students tend to put sleep low on their list of priorities. However, they do not know that it is a bad idea to shorten the hours of sleep in order to get something else done.

Some people can function on three or four hours of sleep per night, but most people cannot. Without sleep, you're not going to be able to concentrate well enough to get the most out of your classes. Having a long list of things that you want to accomplish without having enough sleep will only make you less productive and more stressed. Getting more sleep can help your mind refocus, recharge, and rebalance. This can mean a quick nap, a night when you go to bed early, or a promise to yourself to stick to a regular sleep schedule. Sometimes, getting a good night sleep can be all you need to hit the ground running amidst a stressful time.

More importantly, getting more sleep can reduce stress. Short-term physiological tension and added mental alertness caused by stress are normal. But if you cannot return to the relaxed state, then the changes in your body, such as increased heart rate, start to take
their toll, often leading to mental and physical exhaustion and illness. The combination of stress and lack of sleep increases the likelihood of getting sick. As a consequence, people may feel nauseous, have headaches, experience alterations in appetite, become easily irritable, and more easily susceptible to flu and other viruses. Sleep can help you return to the relaxed state, and balance the negative influences that stress may cause in your life. Consistent sleep is critical for a healthy life.

Here are some tips to help you maintain quality sleep:

- Keep the bedroom dark, quiet, comfortable, and at a proper temperature
- Get regular exercise each day but complete your exercise at least a few hours before bed time
- Don’t have a big meal before going to bed
- Don’t consume caffeine such as coffee, tea, soft drinks, and chocolate close to bedtime
- Don’t consume nicotine including cigarettes or tobacco products close to bedtime
- Don’t watch television, and engage in stimulating activity in the bedroom

Reply messages: Emotional supportive messages

Posted by LoveYourself on November 14, 2009 at 19:55:29:

I know you must feel life is hard as you do not have sufficient amount of sleep and feel stressed. I had a similar experience. I can totally understand how awful it is. I used to have abnormal sleep patterns. Life is so busy. I always find there are a lot of things on my list that I haven’t completed when I plan to go bed. I have to stay up late to finish them but cannot get up early the next day. It is a bad cycle. It makes me feel even more stressed. I tried very hard to adjust my biological clock back to normal. At the beginning, it was extremely frustrating trying to regain a normal sleep pattern. Especially when I could not really fall asleep for many hours even I went bed early. But once you overcome these obstacles during the first few days, you can stick to a regular bedtime schedule. Again, to whom who is experiencing these difficulties, I know how bad you feel when you lay in bed awake and that’s okay. Please remember that you are not alone. We are all behind to support you. You can make a change. Good luck!

Posted by Cat on November 15, 2009 at 12:48:58:

We all know how busy we are in college and it is not easy to balance coursework, part time jobs and tons of extracurricular activities. Especially during final weeks, life is stressful! Don’t be frustrated. Believe me you are not the only one. We are all experiencing these stressful periods. I think the first thing we should do is to maintain regular bedtime
It is also part of daily time management. If you go to bed early at night and get up early the next morning, your day starts early and you have plenty of time to do what you have to do. I don’t think it is a good idea to sacrifice the amount of sleep in order to get other things done. At least you are not alone. We are all struggling together here, and will be fine as soon as final weeks pass!

Reply message: Non-emotional supportive message

Posted by LoveYourself on November 14, 2009 at 19:55:29:

You should not be so upset about your stress. It is not a big deal. There are many other challenges in life after all which may be more difficult. It is only one piece of life and you have to go through this. I know that college students who are stressed usually have abnormal sleep cycles. They stay up late and are unable to wake up in the morning the next day. My only suggestion is to get your biological clock back to the normal. You need to know that maintaining a normal sleep cycle will make you less stressed. It is not easy, but what is? You should be strong. If you’ve decided to change your sleep cycle, you have to do everything to make it happen. Stick to your plan! Here are some other websites for stress management and strategies to get better sleep:

http://helpguide.org/mental/stress_management.relief_coping.htm
http://www.stressreductionbasics.com/stresseducationinclassroom.html
http://www.webmd.com/sleep-disorders/tips-reduce-stress

Posted by Cat on November 15, 2009 at 12:48:58:

Stress comes when you put too much on your plate and pack your schedule with various activities or tasks. You should take the responsibility to manage your life better. But remember it is a bad decision if you sacrifice the number of hours of sleep in order to get other things done. I think the first thing people who are suffering from stress and sleep deprivation or irregularities need to do is to maintain regular bedtime routines. It is also part of daily time management. If you go to bed early at night and get up early the next morning, your day starts early and you have plenty of time to do what you have to do.
Appendix C. Online questionnaire.

In the next page, you will be exposed to several messages (including one original post and two following responses) from an online forum discussing the stress college students experienced. Please pay attention and read carefully. You can click "next" at the bottom of the page after you finish reading.

Please remember that you cannot go back to the messages after clicking the "next" button. It is really important for you to complete reading all the messages on the webpage before you click "next".

After reading the messages, you will be asked to answer some questions. We appreciate your participation in the study and honest responses!

---Participants are exposed to stimulus here---

Section I

1. The following message was the first message you were asked to read. Please click the button that best represents your impression of this message.

---The main message appeared here again---

| The message provides information using a general voice | + + + + + + + + | The message provides information using a lst person voice |
| The message emphasizes factual information | + + + + + + + + | The message emphasizes a personal experience |
| The message is informational | + + + + + + + + | The message is emotionally arousing |
| A character could not be easily identified in the message | + + + + + + + + | A character could be easily identified in the message |

2. Overall, this message was...

| Not persuasive | + + + + + + + + | Persuasive |
| Not credible | + + + + + + + + | Credible |
| Not believable | + + + + + + + + | Believable |
| Not easy to understand | + + + + + + + + | Easy to understand |
| Too short | + + + + + + + + | Too long |
| Not enough information | + + + + + + + + | Too much information |
3. The following are the two response posts to the first message. Please click the button that best represents your feelings about these two messages. These two messages I just read were ...

--The reply message appeared here again--

<table>
<thead>
<tr>
<th>Not sympathetic</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>Sympathetic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not caring</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>Caring</td>
</tr>
<tr>
<td>Discouraging</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>Encouraging</td>
</tr>
<tr>
<td>Cold</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>Warm</td>
</tr>
</tbody>
</table>

4. By reading these messages, you may generate some perceptions of the e-discussion group where these messages are from. Please click the button that best represents your agreement or disagreement with the following statements.

| I could locate someone who really understands my experience by attending e-support forums like this. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could locate some who shows sympathy to my experience by attending this e-support forum | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could feel much less lonely by attending this e-support forum. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could locate someone who expresses sorrow or regret for my distress by attending e-support forums like this. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could locate someone who provides me with hope or confidence by attending this e-support forum. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could locate someone who wants to listen to my story by attending this e-support forum. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could be connected with people whom I may turn to for help by attending e-support forums like this. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could locate someone to give me advice about what to do by attending this e-support forum. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I could locate someone to analyze my situation and tell me about available choices and options by attending this e-support forum. | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
I could locate someone who will help me find out the answers to my questions about my stress by attending this e-support forum. | Strongly Disagree | + + + + + + + | Strongly Agree |
---|---|---|---|
I feel other users of this e-support forum are trustworthy. | Strongly Disagree | + + + + + + + | Strongly Agree |
---|---|---|---|
I feel I cannot be too careful in dealing with other users of this e-support forum. | Strongly Disagree | + + + + + + + | Strongly Agree |
---|---|---|---|
I believe other users in this e-support forum won't make fun of my experiences. | Strongly Disagree | + + + + + + + | Strongly Agree |
---|---|---|---|
I won't be hurt by telling my story in this e-support forum. | Strongly Disagree | + + + + + + + | Strongly Agree |
---|---|---|---|
I think some people/agencies may take advantage of me or misuse my information if I disclosed too much about myself in this e-support forum. | Strongly Disagree | + + + + + + + | Strongly Agree |
---|---|---|---|
Section II

5. You just read several messages from an online discussion forum discussing stress college students experienced. Imagine that you encountered these messages on your own when you browsed on the Internet. Please write a reply to the messages you just read. You can post stories or describe your experiences. You can express your deep thoughts and feelings. You might relate your experience to your relationships with others. All of your writing will be completely confidential.

Please write your answer here:

6. Please click the button that best represents your emotional reactions after reading the messages.

<p>| Affectionate | None of this feeling | + + + + + + | A great deal of this feeling |
| Cheerful | None of this feeling | + + + + + + | A great deal of this feeling |
| Disgusted | None of this feeling | + + + + + + | A great deal of this feeling |
| Embarrassed | None of this feeling | + + + + + + | A great deal of this feeling |
| Fearful | None of this feeling | + + + + + + | A great deal of this feeling |
| Happy | None of this feeling | + + + + + + | A great deal of this feeling |
| Sympathetic | None of this feeling | + + + + + + | A great deal of this feeling |
| Afraid | None of this feeling | + + + + + + | A great deal of this feeling |
| Responsible | None of this feeling | + + + + + + | A great deal of this feeling |
| Dreary | None of this feeling | + + + + + + | A great deal of this feeling |
| Aggravated | None of this feeling | + + + + + + | A great deal of this feeling |</p>
<table>
<thead>
<tr>
<th>Feeling</th>
<th>None of this feeling</th>
<th>+     +     +     +     +     +</th>
<th>A great deal of this feeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Startled</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Dismal</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Sickened</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Angry</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Sad</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Tender</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Annoyed</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Scared</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Revolted</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Astonished</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Compassionate</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Irritated</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Content</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Guilty</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Shamed</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Surprised</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
<tr>
<td>Warmhearted</td>
<td>None of this feeling</td>
<td>+     +     +     +     +     +</td>
<td>A great deal of this feeling</td>
</tr>
</tbody>
</table>

7. Please click the button that best represents your opinion. After reading the message...

| Agreeing With The Statement                                                                 | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
| I agree that it is critical to maintain sufficient sleep                                   | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
| I agree that I should not sacrifice the amount of sleep to get other things done         | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
| I agree that the sufficient sleep can help me be less stressed                           | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |

8. After reading the messages, please indicate your intentions to engage in the following behaviors by click the button that best represents your intentions.

| Behavior                                                                 | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
| I will try my best to maintain sufficient amount of sleep regularly even when I am stressed about life | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
| I won't sacrifice my sleep to deal with my stress                                      | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
| I will keep my bedroom dark                                                            | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
| I will make my bedroom comfortable and at a proper temperature                        | Strongly Disagree | +     +     +     +     +     + | Strongly Agree |
I will maintain regular exercise to help me sleep better

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I won't do exercise a few hours before going to bed

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I won't eat a lot before going to bed

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I won't drink coffee, tea or other beverage that contains caffeine close to bedtime

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I won't eat chocolate close to bedtime

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I won't smoke close to bedtime

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I won't watch television in my bedroom

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I won't play video games or any similar stimulating activity in my bedroom

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I will go to bed early at night

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I will get up early in the morning

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

I will go to bed and get up around same time everyday

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

Section III

In this section, we are interested in learning your reading experience. There is no right or wrong answer. We appreciate your honest response!

9. Please click the button that best represents your opinion about the people who wrote the posts and experienced stress and sleep problems.

| Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

While reading the messages, I felt as if I was part of the action

| Not at all | + | + | + | + | + | + | Very much |

While reading the messages, I forgot myself and was fully absorbed

| Not at all | + | + | + | + | + | + | Very much |

I was able to understand the events in the messages in a manner similar to that in which the post authors understood them

| Not at all | + | + | + | + | + | + | Very much |
| I think I have a good understanding of the post authors | Not at all | + + + + + + + + | Very much |
| I tend to understand the reasons why the post authors do what they do | Not at all | + + + + + + + + | Very much |
| While reading the messages, I could feel the emotions the post authors portrayed | Not at all | + + + + + + + + | Very much |
| During reading the messages, I felt I could really get inside the post authors' heads | Not at all | + + + + + + + + | Very much |
| While reading these messages, I wanted the post authors succeed in achieving their goals | Not at all | + + + + + + + + | Very much |
| When the post authors succeed, I felt joy, but when they failed, I was sad | Not at all | + + + + + + + + | Very much |

10. Please click the button that best represents your opinion of your reading experience.

| While I was reading the message, I could easily picture the events in it taking place | Not at all | + + + + + + + + | Very much |
| While I was reading the message, activity going on in the room around me was on my mind | Not at all | + + + + + + + + | Very much |
| I could picture myself in the scene of the events described in the message | Not at all | + + + + + + + + | Very much |
| I was mentally involved in the messages while reading | Not at all | + + + + + + + + | Very much |
| After the message ended, I found it easy to put it out of my mind | Not at all | + + + + + + + + | Very much |
| I wanted to learn how the message ended | Not at all | + + + + + + + + | Very much |
| The message affected me emotionally | Not at all | + + + + + + + + | Very much |
| I found myself thinking of ways the message could have turned out differently | Not at all | + + + + + + + + | Very much |
| I found my mind wandering while reading the message | Not at all | + + + + + + + + | Very much |
The events in the message are relevant to my everyday life

<table>
<thead>
<tr>
<th>Not at all</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>Very much</th>
</tr>
</thead>
</table>

The events in the message have changed my life

<table>
<thead>
<tr>
<th>Not at all</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>Very much</th>
</tr>
</thead>
</table>

I had a vivid mental image of the post authors who suffered from sleep loss

<table>
<thead>
<tr>
<th>Not at all</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>+</th>
<th>Very much</th>
</tr>
</thead>
</table>

11. Please list any and all thoughts about the messages that arose while you were reading. There is no right or wrong answer. Please take all the space you need.

Please write your answer here:

Section IV

In this section, we are going to collect some information about you including you demographic information, personalities, and experiences. All the information will be confidential.

12. Below are some statements about daily life. Please indicate your agreement or disagreement with these statements by clicking the button that best represents your opinion.

| After seeing a play or movie, I have felt as though I were one of the characters | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I often have tender, concerned feelings for people less fortunate than me | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I sometimes find it difficult to see things from the "other guy's" point of view | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| Sometimes I don't feel very sorry for other people when they having problems | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I really get involved with the feelings of the characters in a novel | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I am usually objective when I watch a movie or play, and I don't often get completely caught up in it | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I try to look at everybody's side of a disagreement before I make a decision | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I sometimes try to understand my friends better by imagining how things look from their perspective | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| When I see someone get hurt, I tend to remain calm | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| Other people's misfortunes do not usually disturb me a great deal | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I believe that there are two sides to every question and try to look at them both | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I would describe myself a pretty soft-hearted person | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| Before criticizing somebody, I try to imagine how I would feel if I were in their place | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| Generally speaking, I would say that most people can be trusted | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I tend to be cynical and skeptical of others' intentions | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I believe that most people will take advantage of you if you let them | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I don't expect I will become good friend with people I know from the cyber space | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I seek for personal and meaningful communication with other people online | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| I am able to describe my feelings easily | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |
| It is difficult to reveal my innermost feelings, even to close friends | Strongly Disagree | + | + | + | + | + | + | Strongly Agree |

13. How often do you experience stress in your daily life?
Never | + | + | + | + | + | + | + | Very often

14. How often do you experience sleep problems (i.e., lack of sleep, irregular sleep cycle) in your daily life?
Never | + | + | + | + | + | + | + | Very often

15. Have you participated in online support group in the past?
Never | + | + | + | + | + | + | + | Very often
16. Please describe your stress level lately.
Not at all + + + + + + + Very much

17. How likely would you personally seek out online support group?
Not likely at all + + + + + + Very likely

18. What is your gender?
     _______ Female     _______ Male

19. How old are you? _______

20 What year of college are you in?
     _______ Freshman
     _______ Sophomore
     _______ Junior
     _______ Senior
     _______ Graduate student

21. What is your racial identity?
     _______ Caucasian American
     _______ African American
     _______ Asian American
     _______ Hispanic American
     _______ Multiracial American
     _______ International
     _______ Other
Appendix D. Coding schemes of participants’ narratives.

1. Coder ID _______
2. Case ID _______
3. Length _______

**Self-disclosure (articulation of one’s own experience and focus on what happened in the reality)**

4. Did the participant identify with people who experienced sleep loss or college stress?  
   ________  
   0 = No  
   1 = Yes: identification only but not telling one’s own story (e.g. I can relate to everything you go through. I totally agree with the two previous people’s replies)  
   2 = Yes: identification and telling one’s own story (e.g., I understand exactly where you are coming from as I suffered from the same problem my first semester freshman year. In the beginning…)

5. How many self-references words did the narrative contain (using LIWC software)? ________

6. Number of qualities of self disclosed ____________

7. Based on the story told by the discloser, how vulnerable would you think the discloser is?  
   0 = Not vulnerable at all (no personal information is disclosed)  
   1 = Somewhat vulnerable (personal information, such as sleep loss, college stress, is disclosed but no secret information is disclosed)  
   2 = Moderately vulnerable (personal information such as missing class, fighting with roommates is disclosed)  
   3 = High vulnerable (personal information such as relationship breakup, family loss, is disclosed)
4 = Extremely vulnerable (Secret information such as stigmatized illness is disclosed, i.e., depression, sexually transmitted diseases)

**Expressive writing (elaboration on one’s feelings)**

8. Please draw a line to represent the up and downs of the narrative disclosed by the participant such as:

9. How many times did the narrative go up? __________

10. How many times did the narrative go down? __________

11. What was the position of the ending point? ____________
   0 = lowest point of the narrative
   1 = middle point but lower than the starting point
   2 = middle point but higher than the starting point
   3 = middle point: similar with starting point
   4 = highest point

12. How many of the emotional words were positive (using LIWC software)? __________
13. How many of the emotional words were negative (using LIWC software)? __________

**Insightful writing**

14. How many cognitive words did the narrative contain (using LIWC software)? __________

15. A. Using the following coding schemes, how many pro-message thoughts did the narrative contain (please code the number of the pro-message thoughts)? __________

B. Please code the variety of pro-message thoughts contained by the narrative using the following coding schemes? __________

a) College life is stressed and overwhelming (such as mentioning of a long task list, or balancing among different tasks, or describing how challenge to experience the transition to college life…)

b) College students usually have sleep problems (i.e., lack of sleep, abnormal sleep cycles)

c) Stress and sleep problems will make you sick
   - Or mentioning consequences of lack of sleep and stress, including bad appetite, feeling nauseous, headaches, get irritated and weakened immune system (i.e., getting a flu easily)

d) Lack of sleep could make you less productive, while maintaining a sufficient and quality sleep would make you mind focus and make you work more productively

e) It is not a good idea to sacrifice the amount of sleep

f) It is good to maintain sufficient and regular sleep:
   a. You can control your stress by maintaining a sufficient amount of sleep
   b. Maintaining a sufficient and quality sleep is good to health

g) Strategies of maintaining a good sleep:
   a. Don’t have a big meal before going to bed
   b. Don’t consume caffeine such as coffee, tea, soft drinks, and chocolate close to bedtime
   c. Don’t consume nicotine including cigarettes or tobacco products close to bedtime
   d. Don’t watch television, and engage in stimulating activity in the bedroom

h) Adjust biological clock back to maintain normal sleep cycles

i) Maintain regular bedtime routines (i.e., go to bed early and get up early)

j) Healthy life style choice to deal with college stress

k) Positive evaluations of the messages
16. A. Using the following coding schemes, how many counter-message thought did the narrative contain? ___________

B. Using the following coding schemes, please code the variety of counter-message thoughts that contained by the narrative ___________

   a) College life is not stressed or college students do not have sleep problems
   b) It is not a serious issue if I don’t sleep too much
   c) Stress is not controllable
   d) There is no way we can deal with sleep deprivation or sleep irregularities during college life
   e) Negative evaluation of the messages
   f) Sleep did not work to reduce stress

**Advice/Suggestion (Transformation)**

17. Suggestions (please code the numbers of suggestions)

   a. Sleep ___________
      i. Don’t have a big meal before going to bed _______
      ii. Don’t consume caffeine such as coffee, tea, soft drinks, and chocolate close to bedtime _______
      iii. Don’t consume nicotine including cigarettes or tobacco products close to bedtime _______
      iv. Don’t watch television, and engage in stimulating activity in the bedroom _______
      v. Maintain regular bedtime routines _______
      vi. Adjust biological clock back to normal _______
      vii. Other strategies about maintaining sufficient and quality sleep___________

   b. Time management _____________
      Such as mentioning of efficiency, priority, cutting the list, fixing your schedule, and balancing

   c. Mood management _____________
   d. Relax by going social _____________
   e. Sacrifice social life _____________
   f. Exercise _____________
   g. Eating/Nutrition _____________
   h. Other (please specify) _____________
18. What frame does the narrative use? _____________
   1 = Reconstruction (i.e., we suffered from stress and sleep loss, but we can find a positive way to solve the problem)
   2 = Internalization (i.e., stress and sleep problems are the necessary part of college life, it is not a big deal)
   3 = Suffering (i.e., life sucks)
   4 = Third-person support (i.e., no mention of self experience or self evaluation of college life, only support provision)
   5 = Message evaluations (i.e., defensive avoidance/denial/reactance)
   6 = Other

**Coherence and structure**

19. Does the narrative contain any contradictions? (i.e., temporal disorders) ____________
   0 = No
   1 = Yes

20. Please code the organization of the narrative (i.e. 14332) ____________
   1 = Support (e.g., I can totally understand you... Good luck!)
   2 = Identification (e.g., I can relate to your message very well)
   3 = Experience (e.g., elaboration of one's own experience)
   4 = Advice/Solution

21. Please code the sentences that used articulation mode (i.e., #12) ________________

22. Please code the sentences that used elaboration mode (i.e., #34) ________________

23. Please code the sentences that used transformation mode (i.e., #5) ________________
VITAE

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EDUCATION

- Ph.D., Mass Communication, The Pennsylvania State University, University Park, PA, August 2006 – August 2010.
- B.A., Journalism, Fudan University, Shanghai, P. R. China, September 2000 – June 2004.

CONFERENCE PRESENTATIONS