Health Blogging: An Examination of the Outcomes Associated With Making Public, Written Disclosures About Health

Stephen A. Rains[1] and David M. Keating[2]

Abstract

The reported study explored the implications of making public, written disclosures about illness-related experiences in the context of health blogging. The outcomes associated with specific forms of expression used by bloggers and their readers were investigated. A panel study was conducted among 72 individuals who live with and blog about their experiences with a specific health condition. The results, although modest, show that elements of health blogging are associated with improvements in bloggers' well-being. Bloggers' use of insight words was associated with decreased health-related uncertainty and, among bloggers who posted relatively more frequently, increased purpose in life. Additionally, for those bloggers whose readers commented more frequently, readers' use of negative emotion words was associated with increased perceptions of personal growth among bloggers.

Keywords

blogging, health communication, new communication technologies, well-being

Communication technologies made possible by the Internet have increased opportunities for individuals living and coping with illness to share their experiences with others. Computer-mediated support groups (Shim, Cappella, & Han, 2011; Wright & Bell, 2003), social network websites (Bender, Jimenez-Marroquin, & Jadad, 2011), and web-logs (i.e., blogs; Sundar, Edwards, Hu, & Stavrositu, 2007) are a few of the technologies that have given

[1]University of Arizona, Tuscon, AZ, USA
[2]Michigan State University, East Lansing, MI, USA

Corresponding Author:
Stephen A. Rains, University of Arizona, Department of Communication, University of Arizona, Tuscon, AZ 85721-0025, USA.
Email: srains@email.arizona.edu

individuals a platform from which they can discuss their lives with illness. Blogs, in particular, are noteworthy because they can serve as a personal journal in which individuals have the opportunity to publicly chronicle their experiences (Herring, Scheidt, Bonus, & Wright, 2004). Indeed, blogs have been argued to "allow for detailed experiential exposition . . . thus helping [one] reveal and cogitate over every minor detail pertaining to [one's] experience of . . . illness" (Sundar et al., 2007, p. 99). Yet the content and outcomes of such revelations and cogitations warrant greater consideration.

The project reported here involved a panel study exploring the implications of making public, written disclosures about health in the context of blogging. Drawing from the expressive writing paradigm (Pennebaker, 1997a, 2010) and research on social support (Braithwaite, Waldron, & Finn, 1999; Cohen & Wills, 1985), associations among specific forms of expression and changes in well-being were examined, as were the impact of reader comments. The results of this research offer insights about the potential benefits of blogging about health by focusing on the consequences of bloggers' disclosures and readers' comments for bloggers' well-being. In the following paragraphs, we first introduce research on health blogging and then discuss scholarship on written disclosure and social support to provide a foundation for study hypotheses and research questions.

Literature Review

Health Blogging

Recent estimates indicate that approximately 12 million Americans author a blog (Lenhart & Fox, 2006). Although various genres of blogs exist, this study focuses on personal journal–type blogs involving an ongoing narrative about bloggers' life experiences (Herring et al., 2004). Blogs describing an individual's experience with a health condition are among the most popular type of health-related blogs (Miller & Pole, 2010; Sundar et al., 2007). Researchers studying health blogging have examined demographic differences in health bloggers (Kim & Chung, 2007; Miller & Pole, 2010; Miller, Pole, & Bateman, 2011), motivations for health blogging (Chung & Kim, 2008), the types of tags that bloggers use to demarcate their posts (Kim, 2009), and blogs authored by medical professionals (Buis & Carpenter, 2009; Lagu, Kaufman, Asch, & Armstrong, 2008). Blogs have also been used as a means to understand responses to public health events such as anxiety about the 2009 H1N1 outbreak (Tausczik, Faasee, Pennebaker, & Petrie, 2012) and controversy surrounding acetaminophen recommendations (Mackert, Love, Donovan-Kicken, & Uhle, 2011).

There is also evidence that blogs are used by individuals suffering from one or more specific health conditions as a mechanism for coping. Interview (Sanford, 2010; Tan, 2008) and survey-based (Rains & Keating, 2011; Sundar et al., 2007) studies have found evidence that facilitating social connection and venting are key motivations for and outcomes of health blogging. Rains and Keating, for example, showed that, among bloggers who were relatively lacking in support from their friends and family, social support from blog readers was negatively associated with loneliness. Venting and seeking advice was a

theme that emerged in Sanford's interviews with weight-loss bloggers. Blogging about the challenges and triumphs of attempting to lose weight was cathartic for some of the bloggers in her study.

Despite evidence that blogging can facilitate coping, relatively little research has examined the actual content of personal journal–type health blogs. Hoyt and Pasupathi (2008) reported that, among the 30 bloggers in their sample writing about traumatic events such as cancer treatments or Hurricane Katrina, bloggers who were rated as showing recovery or no change used more positive than negative emotion words and more cognitive words per blog entry than bloggers who were rated as worsening. Chung (2009) reported that use of positive emotion words by weight-loss bloggers was positively associated with reductions in body weight. Clarke and van Amerom (2008) examined gender differences in the blogs of individuals who self-identified as being depressed. Although both groups wrote about pharmaceuticals, more men wrote about self-harm and more women wrote about self-help or psychotherapy. Granted claims that the act of articulating one's thoughts in writing as part of one's blog may be therapeutic (Nagel & Anthony, 2009; Tan, 2008), additional research is essential to better understand bloggers' expressions and readers' responses and the consequences of that discourse for the well-being of bloggers. This study examines the implications of making written disclosures in public by first considering the potential consequences of specific forms of expression used by bloggers and then reflecting on the potential outcomes of reader comments.

Written Disclosure About Health

Scholarship on expressive writing and written self-disclosure in the context of computer-mediated support groups offers several reasons that blogging might be therapeutic. Research on expressive writing examines the implications of journaling about a traumatic life event such as illness (Lepore & Smyth, 2002; Pennebaker, 1997a). The expressive writing paradigm is rooted in the basic idea that "confronting deeply personal issues has been found to promote physical health, subjective well-being, and selected adaptive behaviors" (Pennebaker, 1997b, p. 162). Participants in expressive writing studies are asked to write about a difficult experience in private for 15 to 30 minutes per day during 3 to 5 consecutive days (Pennebaker, 1997b). Frattaroli (2006) reported in her meta-analysis of nearly 150 studies that, overall, expressive writing has some therapeutic benefits ($r = .075$). Although health blogs are distinct from expressive writing in that they represent an enduring and public narrative that is continually being constructed, there are also some key similarities. Blogging is similar to expressive writing in that health bloggers are articulating in writing their experiences during a traumatic life event. Bloggers have the opportunity to write in-depth and without constraint (Sundar et al., 2007).

Researchers studying computer-mediated support groups have applied theory from the expressive writing paradigm to investigate the outcomes of health-related disclosure (Lieberman, 2007; Lieberman & Goldstein, 2006; Shaw, Hawkins, McTavish, Pingree, & Gustafson, 2006; Shim et al., 2011). In such work, specific types of discourse

are considered to be indicators of underlying therapeutic processes. Consistent with the exposure-habituation model (Kloss & Lisman, 2002; Lepore, 1997), the use of negative emotion words (e.g., "hurt," "sad," "dishearten") has been argued to reflect exposure to aversive elements of an experience. Repeated exposure may result in habituation in which individuals become less reactive to the aversive stimuli. Shim et al.'s study of computer-mediated support groups for women diagnosed with breast cancer reported evidence consistent with the idea that disclosure of negative emotions fosters improvements in well-being by mitigating the impact of intrusive thoughts about illness (i.e., breast cancer).

Consistent with the cognitive adaptation model (Pennebaker, 1997a), the use of insight words (e.g., "realize," "understand") may represent attempts by a writer to make sense of an event. Insight words signal understanding and self-reflection (Pennebaker, 1993; Pennebaker, Mayne, & Francis, 1997) and suggest that an experience is being assimilated thereby reducing its deleterious effects. Positive associations between use of insight words and participants' well-being have been reported in two computer-mediated support group interventions for women with breast cancer (Lieberman, 2007; Shaw et al., 2006). More recently, Shim et al. (2011) reported that disclosure of insight words fostered health benefits among women diagnosed with breast cancer by reducing the amount of breast cancer concerns they experienced. Finally, the implications of positive emotion words (e.g., "hope," "love," "encourage") have been examined in research on computer-mediated support groups (Shim et al., 2011). Although the specific mechanism through which positive emotion words function is unclear, Lepore, Greenberg, Bruno, and Smyth (2002, p. 103) propose that "positive emotion can 'undo' or attenuate residual arousal and long-term distress that may result from negative emotional responses to stressors."

It seems plausible that theories designed to explain the outcome of expressive writing and used in studies of health-related disclosure in computer-mediated support groups might apply to health bloggers. Articulating one's experiences in writing might serve as a coping mechanism and impact bloggers' perceptions and experiences of their illness and life with illness. In short, health blogging—and, more specifically, particular forms of expression—might signal underlying therapeutic processes and be associated with improvements in bloggers' well-being. Well-being is operationally defined in this project as four variables that are particularly relevant to bloggers and their illness experience: depression, health-related uncertainty, personal growth, and purpose in life. Health-related uncertainty, which involves beliefs about the predictability and understandability of one's illness (Mischel, 1981), and depression (Radloff, 1977) are useful indicators of the degree to which blogging allows bloggers to cope with the challenges presented by their illness. Bloggers who are coping more effectively should report lower levels of depression and health-related uncertainty. Personal growth, which consists of perceptions that one is progressing (Ryff & Singer, 1998), and purpose in life, which involves perceptions that one's life has meaning (Ryff & Singer, 1998), reflect the degree to which blogging allows bloggers to evolve as a result of their life with illness. Bloggers who are evolving should report higher levels of personal growth and purpose in life.

Scholarship on expressive writing and disclosure in computer-mediated support groups suggests several predictions about the relationships among blogging behavior and well-being. First, participation in blogging, which is operationally defined in this project as the number of posts made per week by bloggers, might be associated with improvements in bloggers' well-being. In her meta-analysis of expressive writing research, Frattaroli (2006) reported that the number of writing sessions moderated the effects of expressive writing. Studies in which participants wrote for at least three sessions reported marginally larger effects than studies in which participants wrote for two or fewer sessions. It seems plausible that bloggers who post more frequently accrue greater benefits from blogging.

Hypothesis 1 (H1): The number of posts made per week by bloggers is associated with improvements in bloggers' well-being.

Second, as in studies of computer-mediated support groups, the use of positive emotion words, negative emotion words, and insight words by bloggers should be associated with improvements in bloggers' well-being. The use of these three categories of words reflects underlying processes that ultimately foster improvements in well-being. Habituating to aversive stimuli (Kloss & Lisman, 2002; Lepore, 1997), structuring and integrating health-related events (Pennebaker, 1997a), and experiencing positive emotions (Lepore et al., 2002) should lead bloggers to more effectively cope with the challenges presented by their illness and feel reduced levels of depression and health-related uncertainty, as well as to continue evolving in their lives-with-illness and feel an increased sense of personal growth and purpose in life. As in prior research (e.g., Pennebaker et al., 1997; Shim et al., 2011), the use of insight and emotion words is assessed as the percentage of each type of word used relative to the total number of words written. Evaluating word use in terms of the proportion of total words used makes it possible to account for differences in the total number of words written by bloggers.

Hypothesis 2 (H2): Proportion of (a) positive emotion words, (b) negative emotion words, and (c) insight words blogged is associated with improvements in bloggers' well-being.

Third, it also seems possible that the frequency with which bloggers participate in their blogs might moderate the impact of using positive emotion, negative emotion, and insight words on bloggers' well-being. The underlying mechanisms associated with using positive emotion, negative emotion, and insight words could be contingent upon the total amount that these words are used. For example, bloggers who use a large proportion of negative emotion words and post more frequently may be more likely to habituate to the aversive stimuli than bloggers who use a large proportion of negative emotion words but post less frequently. Accordingly, an interaction may exist between the number of posts bloggers make per week and the use of positive emotion, negative emotion, and insight words for bloggers' well-being. The use of these types of words should be particularly important among bloggers who make more frequent blog posts.

Hypothesis 3 (H3): An interaction exists between blog posts per week and propor-
tion of (a) positive emotion words, (b) negative emotion words, and (c) insight
words blogged for improvements in bloggers' well-being.

Public Disclosures About Health

As previously noted, a novel dimension of health blogs is that they may be available to the
public and read by a range of people. Blogging is an inherently social activity in which the
audience has the opportunity for direct participation (Nardi, Schiano, & Gumbrecht, 2004;
Stefanone & Jang, 2008). Many blogs include a comments feature that allows readers to
provide public feedback to the blogger. The public nature of bloggers' writing and, in
particular, the opportunity for reader responses may have important implications for the
outcomes of health blogging.

Scholarship on social support offers a framework to examine the nature of responses to
bloggers and their writing and the implications of such responses for the blogger. Social
support is generally defined as communication that functions to manage uncertainty and
increase one's perceptions of control (Goldsmith, 2004). It involves "providing a sense of
reassurance, validation, and acceptance . . . and connecting or integrating structurally
within a web of ties in a supportive network" (Albrecht & Goldsmith, 2003, p. 265). The
buffering hypothesis (Cohen & Wills, 1985) posits that social support fosters positive
health outcomes by serving as a mediator between a stressor and a stress response. More
generally, Burleson (2009) notes that supportive messages can impact health by enhancing
one's coping resources and improving personal relationships. Research examining health-
related online support groups has shown that participation in formal computer-mediated
groups is associated with increases in perceived support and improvements in health out-
comes such as depression and quality of life (Rains & Young, 2009).

Although several different types of support have been identified (Cutrona & Russell,
1987), two are most germane to this study: emotional and information support. In the con-
text of research examining computer-mediated support groups, emotional support has been
defined as attempts to reciprocate emotion in order to aid the emotional states and expres-
sions of message recipients and information support has been conceptualized as attempts
to reduce uncertainty for message recipients by conveying instructions and situation
appraisals (Braithwaite et al., 1999). The use of negative emotion words, positive emotion
words, and insight words in reader comments may signal different forms of supportive
messages. Positive and negative emotion words may be used primarily when readers are
communicating emotional support. Emotional support messages signaling encouragement,
for example, are likely to include positive emotion words such as "happy" and "good."
Negative emotion words such as "hurt" and "sad" may occur in emotional support mes-
sages that provide sympathy. Insight words might be used primarily when readers are com-
municating information support. Information support messages that offer advice, for
example, are likely to include insight words like "think" and "recognize" in an effort to
help bloggers understand their experiences.

Research on social support suggests that information and emotional support from readers may foster improvements in bloggers' well-being. Prior research has demonstrated that emotional support is associated with beneficial health outcomes such as reduced depression (Schaefer, Coyne, & Lazarus, 1981) and increased quality of life and emotional status (Kulik & Mahler, 1993) and information support is associated with positive morale (Schaefer et al., 1981). Content analyses also offer evidence that emotional and information support are commonly shared in online support groups (Coursaris & Liu, 2009; Keating, 2012). As indicators of emotional and information support, the use of positive emotion words, negative emotion words, and insight words by blog readers might be associated with improvements in bloggers' well being.

Consistent with the buffering hypothesis (Cohen & Wills, 1985), these specific forms of social support may serve as a buffer between the stressors faced by bloggers and a stress response. Emotional and information support from readers may help bloggers respond more effectively to their illness experiences and result in improvements in well-being. After accounting for the variance explained by bloggers' participation and writing (e.g., posts per week, use of positive emotion words, etc.), it seems possible that the mean number of comments made by readers per week as well as the proportion of positive emotion, negative emotion, and insight words in reader comments may be associated with improvements in bloggers' well-being. Furthermore, the frequency of reader comments might moderate the impact of positive emotion, negative emotion, and insight words on bloggers' improvements in well-being. The use of emotion and insight words should be particularly important when reader comments are relatively frequent. The following research questions are proposed to examine the implications of reader comments for bloggers' well-being.

Research Question 1 (RQ1): After accounting for the variance explained by bloggers' written expression (i.e., the mean number of posts per week made by bloggers and proportions of positive emotion words, negative emotion words, and insight words used by bloggers), is there a relationship between the number of reader comments per week and improvements in bloggers' well-being?

Research Question 2 (RQ2): After accounting for bloggers' written expression, is there a relationship between the proportion of (a) positive emotion words, (b) negative emotion words, and (c) insight words used by blog readers and improvements in bloggers' well-being?

Research Question 3 (RQ3): After accounting for bloggers' written expression, is there an interaction between the number of reader comments per week and readers' use of (a) positive emotion words, (b) negative emotion words, and (c) insight words for improvements in bloggers' well-being?

Method

A panel study was conducted to test the hypotheses and answer the research questions. Seventy-two health bloggers completed an initial questionnaire about their well-being and

a follow-up questionnaire 8 weeks later. A content analysis was conducted to examine respondents' blogs between the initial and follow-up questionnaires.

Sampling Procedure and Participants

A two-phase sampling procedure was used to identify individuals who authored a blog about their experiences living and coping with a health condition. It is not possible to know the population of individuals who presently blog about health and, thus, impossible to recruit a random sample. Accordingly, the overarching goal of the sampling procedure was to identify a diverse sample that is as representative of the population of health bloggers as reasonably possible. To identify active health blogs, we first conducted a general search of four popular blog-hosting websites (i.e., blogspot.com, wordpress.com, typepad.com, and livejournal.com; Lenhart & Fox, 2006) using 22 search phrases and Google and Yahoo!'s search engines. All searches were restricted to one of the four blog-hosting website domains; search results were limited to recently updated blogs written in English.

The 22 different search phrases were associated with health in general as well as with specific health conditions common in the United States. Eleven terms related to health were first selected. To identify blogs about a wide range of health conditions, five search terms were identified that generally refer to health: condition, disability, disease, disorder, and illness. To identify blogs about specific health conditions, six search terms were used that represent conditions that are either common causes of mortality or serious health conditions among Americans (Beck & Alford, 2009; Centers for Disease Control and Prevention, 2009; Harmon, Barroso, Pence, Leserman, & Salahuddin, 2007): Alzheimer's disease, cancer, depression, diabetes, heart disease, and HIV. Each of these 11 terms was then paired with two different qualifiers (i.e., dealing with; living with), resulting in a total of 22 search phrases (e.g., "dealing with" and "illness;" "living with" and "diabetes;" etc.).

A total of 176 searches were conducted. Google and Yahoo!'s search engines and the 22 phrases were used to separately examine the four blog-hosting websites. Because each individual search could yield up to 1,000 results, we randomly selected and reviewed 100 of the results from each search. Blogs that were authored by an individual coping with a health condition, focused on the author's experience with the health condition, and updated in the previous 6 weeks were included in the sample. This procedure resulted in a total of 253 unique health blogs.

The second phase consisted of reviewing the blogrolls from these 253 blogs. The blogroll is a feature that displays a list of blogs that the author presumably follows. We reviewed the blogroll for each of the 253 blogs to identify any additional blogs that met the criteria to be included in the sample. An additional 131 health blogs were identified.

The two sampling strategies resulted in a total of 384 health blogs. Blog authors were recruited to participate by posting a note on each blog that informed the author about the project and included a link to the study questionnaire. A total of 121 respondents sufficiently completed the initial questionnaire. At the conclusion of the first questionnaire, respondents were asked whether they would be willing to complete a follow-up questionnaire. All but one respondent agreed. Of the 120 respondents who agreed to the follow-up,

76 completed the follow-up questionnaire. Four respondents, however, did not make any blog posts in the time between completing the initial and follow-up questionnaires and were excluded from the analyses. Data from the 72 respondents who completed the questionnaires at both time points and contributed to their blog in the interval in between were analyzed in this project. There were no statistically significant differences in terms of demographics (age, gender, education) or the outcome variables between those respondents who dropped out of the study and those who completed both questionnaires. Questionnaires were completed between approximately May and September of 2010. A mean of approximately 8 weeks elapsed between the two questionnaires ($M = 7.70$, $SD = 1.60$).

Respondents were more likely to be female (75%, $n = 54$) and ranged in age from 18 to 67 years ($M = 45.82$, $SD = 11.58$). More than two thirds of respondents (72.3%) reported having a college degree or more advanced education. At the time that the first questionnaire was completed, the blogs analyzed in this project had been in existence for a mean of 1.99 years ($SD = 1.63$). Respondents reported that approximately 70% ($SD = 23.36$) of their blogs were about issues directly related to their health. Almost all respondents (97.2%, $n = 70$) reported having been formally diagnosed by a medical doctor with the condition about which they blog. Respondents reported having and blogging about a range of health conditions including, but not limited to, Asperger's syndrome, asthma, bipolar disorder, cancer, delayed sleep phase disorder, depression, diabetes, disordered eating, Ehlers-Danlos syndrome, fibromyalgia, Grave's disease, HIV, Lyme disease, lupus, multiple sclerosis, muscular dystrophy, Parkinson's disease, rheumatoid arthritis, Sjogren's syndrome, and ulcerative colitis.

Instrumentation

Unless otherwise noted, all measures were rated on a 7-point scale with the anchors 1= *strongly disagree* and 7 = *strongly agree*. Greater scores represent more of a given variable.

Measures of well-being. *Depression* was measured using the 10-item version of the Center for Epidemiological Studies Depression Scale (CES-D; Kohout, Berkman, Evans, & Cornoni-Huntley, 1993; Radloff, 1977). Ratings were made on a 4-point scale with the anchors 1 = *rarely or none of the time* and 4 = *most or all of the time* (Time 1: $M = 1.91$, $SD = 0.61$, $\alpha = .87$; Time 2: $M = 1.89$, $SD = 0.60$, $\alpha = .88$). *Health-related uncertainty* was measured using four items from Mishel's (1981) Uncertainty in Illness Scale (Time 1: $M = 3.97$, $SD = 1.30$, $\alpha = .67$; Time 2: $M = 3.85$, $SD = 1.43$, $\alpha = .73$). The four items address the degree to which respondents perceived their symptoms, illness, and lives to be unpredictable. *Purpose in life* and *personal growth* were measured using subscales from Ryff's (1989) measure of psychological well-being. Four items from the Purpose in Life subscale were used to evaluate the degree to which respondents perceived their lives to have meaning (Time 1: $M = 6.15$, $SD = 0.98$, $\alpha = .80$; Time 2: $M = 6.10$, $SD = 0.88$, $\alpha = .78$); four items from the Personal Growth subscale were used to assess the degree to which respondents believed that they are realizing their potential and evolving (Time 1: $M = 5.99$, SD, $= 1.04$, $\alpha = .83$; Time 2: $M = 6.00$, $SD = 0.99$, $\alpha = .89$).

Health blogging. All of the blogs in the sample were reviewed by one of the authors to identify the number of blog posts and the number of reader comments during the interval in between when respondents completed the initial and follow-up questionnaires. Blog posts and reader comments are reported in terms of the mean number per week to account for the varying number of weeks that elapsed between when respondents completed the two questionnaires. Respondents made a mean of 2.57 posts per week ($SD = 2.40$), and blogs included a mean of 7.96 reader comments per week ($SD = 11.10$).

Content Analysis

All blog posts made by respondents and comments made by readers during the interval in between the initial and follow-up questionnaires were recorded by one of the authors. Following prior research on expressive writing (e.g., Pennebaker et al., 1997), the blogs and comments were analyzed using Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2007) computer program. LIWC is a content analysis program that counts the occurrence of words from over 80 different content categories. The content categories used in LIWC were originally constructed using a multistage process and validated by comparing LIWC output with ratings made by human coders (for a review, see Pennebaker, Chung, Ireland, Gonzales, & Booth, 2007). It is noteworthy that LIWC has been applied in several studies examining the implications of self-disclosure in health-focused computer-mediated support groups (e.g., Shaw et al., 2006; Shim et al., 2011).

This project focused on three specific categories coded by LIWC. The insight words category contains 195 words that reflect self-reflective thinking and understanding (e.g., "realize," "understand"). The positive emotion words category includes 406 words that reflect positive emotions (e.g., "love," "contentment"), and the negative emotion words category includes 499 words that reflect negative emotions (e.g., "hurt," "sad"). Correlations between LIWC and human coders for positive emotion words, negative emotion words, and insight words have been shown to range from $r = .64$ to .77 (Pennebaker et al., 1997). To account for the influence of the total number of words written, LIWC reports word use as a proportion of the total number of words written. Of the total number of words written by bloggers ($M = 8,433.03$, $SD = 7,597.88$), a mean of 2.38% ($SD = 0.52$) were insight words, 3.57% ($SD = 1.04$) were positive emotion words, and 1.97% ($SD = 0.66$) were negative emotion words. Of the total number of words written by readers in their comments ($M = 2,978.83$, $SD = 4,855.96$), a mean of 2.92% ($SD = 1.06$) were insight words, 6.18% ($SD = 2.08$) were positive emotion words, and 2.00% ($SD = 1.01$) were negative emotion words. Sample quotes from bloggers and readers—amended to protect the identity of bloggers—illustrating each category of discourse are reported in Table 1.

Control Variables

Seven control variables were included in all of the analyses. Granted the potential influence of demographic differences between participants, respondents' *age* ($M = 45.82$, $SD = 11.58$), *gender* (female = 75%), and *education* were included as control variables. Education

Table 1. Sample Quotes Illustrating Bloggers' and Readers' Use of Emotion and Insight Words.

Word type	Blogger quotes	Word type	Reader quotes
Positive emotion	I'm beginning to feel a bit better. Hopefully, things will improve day by day.	Positive emotion	That's so great. I'm proud of you. HUGS!
	It doesn't feel like I've given up anything at all now. Rather, so much fills my life that is happy, pleasant, fulfilling, and satisfying.		Sending comforting and reassuring tail wags to you.
Negative emotion	My pain is at the core of my ongoing struggles. A constant reminder, always lurking, manifesting itself in different ways; sadness, melancholy, depression, frustration, anger.	Negative emotion	I'm so sick of all parties. Every one in the end disappoints us and works for themselves and their special interest rather than ours.
	This constant pain is draining my strength, making me angry and hopeless.		Cancer sucks, and I hate that you have to deal with this.
Insight	Sometimes it seems like the way people talk to me and look at me triggers this reflection on my part as to whether I fully understand the seriousness of my situation.	Insight	I may seem bullish to other people, but I think to totally cope with your diabetes, you have to understand it is part of you—you have no choice!
	I didn't really believe that I just sat around for a month, but it's a far cry from working 12 hours per day that I didn't realize that I had accomplished until now.		Personally, I suspect you are doing too much, but only you can determine that.

Note: Quotes were edited by the authors in order to maintain the confidentiality of bloggers in the sample. The positive emotion, negative emotion, and insight words used by bloggers were not changed when editing the quotes.

was rated on a 6-point scale ranging from 1 = *less than high school* to 6 = *graduate school* (*M* = 4.43, *SD* = 1.28). Respondents' *total days blogging* was assessed by identifying the number of days that had elapsed since respondents started their blogs (*M* = 708.63, *SD* = 558.10). It seems possible that those bloggers who had been writing for longer periods of time might be more adept at expressing their thoughts and feelings and, consequently, may achieve greater benefits than those respondents who were relatively new to blogging about health. The *percentage of blog dedicated to health* was also included as a control variable. Although most respondents reported that a majority of their blog was dedicated to issues directly related to their health (*M* = 71.7%, *SD* = 23.36), there was enough variance in this

measure to warrant including it as a control variable. Given prior research suggesting the potential influence of having strong ties such as family and friends as blog readers (Stefanone & Jang, 2007), the *percentage of readers who were family and friends* was included as a control variable. Respondents estimated the percentage of their blog readers who were friends or family at the time of the second questionnaire (*M* = 26.22%, *SD* = 28.23). Respondents' self-reported *change in health* between completing the initial and follow-up questionnaires was included as a control variable to account for the influence that a change in health might have on their well-being. In both questionnaires, respondents rated their current health on a 7-point measure ranging from 1 = *very poor* to 7 = *very good*. Ratings of this item from the initial questionnaire were subtracted from ratings made in the follow-up questionnaire (*M* = 0.04, *SD* = 1.26); positive values indicate an improvement in health across the two measurement points.

Results

Preliminary Analyses

The data were first screened following Tabachnick and Fidell's (2001) recommendations. Univariate outliers were identified for the following measures: total days blogging (*n* = 2), blog posts per week (*n* = 1), positive emotion words used by bloggers (*n* = 1), reader comments per week (*n* = 1), negative emotion words in reader comments (*n* = 1), positive emotion words in reader comments (*n* = 1), and insight words in reader comments (*n* = 1). Outlying cases were re-assigned to the value that is three standard deviations greater than the mean for each respective measure.

Hypotheses H1 to H3: Health Blogging and Well-Being

H1 to H3 make predictions about the relationship between health blogging and well-being. H1 predicts that blogging (in the form of posts made per week) would be associated with improvements in bloggers' well-being. H2a to H2c predict that the proportions of positive emotion words, negative emotion words, and insight words used by bloggers would be associated with improvements in bloggers' well-being. H3a to H3c predict an interaction between blog posts per week and positive emotion words, negative emotion words, and insight words for improvements in bloggers' well-being. Well-being was measured using four variables: depression, health-related uncertainty, personal growth, and purpose in life.

Four regression models were constructed to test the preceding hypotheses. The four models were identical, with the exception of the outcome variable: depression, health-related uncertainty, personal growth, or purpose in life. Total days blogging, which reflects the days elapsed since a blog was started, the percentage of blog dedicated to health, proportion of readers who were family and friends, age, gender, education, and change in health were included in the first block of the models as control variables. Also included in the first block was the measure of the outcome variable at the time respondents completed the initial questionnaire (i.e., the lagged outcome variable); including, and thus controlling

for, the outcome variable at the initial measurement point makes it possible to assess changes in the outcome variable at the time of the follow-up questionnaire (Cohen, Cohen, West, & Aiken, 2003). The number of blog posts made per week was included in the second block of the models. The proportions of positive emotion words, negative emotion words, and insight words used by bloggers were included in the third block. The fourth block of the models consisted of the interactions between the number of blog posts made per week and the percentage of positive emotion words, negative emotion words, and insight words. The number of blog posts per week, positive emotion words, negative emotion words, and insight words were mean centered prior to constructing the models; mean centering helps mitigate multicollinearity and facilitates the interpretation of interaction effects (Cohen et al., 2003).

The results, which are illustrated in Table 2, do not support H1. The number of posts per week made by bloggers was not associated with any of the four measures of well-being. The results provide mixed support for H2c. After accounting for the control variables and the number of posts per week made by bloggers, the use of insight words was negatively associated with changes in health-related uncertainty. Respondents who wrote a greater proportion of insight words reported reduced health-related uncertainty. No support was found for H2a and H2b; positive emotion words and negative emotion words were not associated with any of the four measures of well-being.

Mixed support was found for H3b and H3c. There were significant interactions between blog posts per week and negative emotion words for bloggers' perceptions of personal growth and depression as well as between blog posts per week and insight words for perceptions of purpose in life. These three interactions were decomposed using the macro for SPSS created by Hayes and Matthes (2009). The associations between the word use variables and measures of well-being were computed at 1 standard deviation above the mean number of blog posts per week, at the mean number of blog posts per week, and at 1 standard deviation below the mean number of blog posts per week. The results, which are illustrated in Figures 1 to 3, suggest similar trends for all three interactions. Among bloggers who made relatively more posts per week, the unstandardized regression coefficients indicate that respondents who used a greater number of negative emotion words reported increased personal growth and decreased depression and respondents who used a greater number of insight words reported increased purpose in life. However, only the simple slope for the relationship between use of insight words and purpose in life was significant. Among bloggers who made relatively fewer posts per week, the unstandardized regression coefficients suggest that respondents who used a greater number of negative emotion words reported decreased personal growth and increased depression and that respondents who used a greater number of insight words reported decreased purpose in life. However, only the simple slopes for the relationships between use of negative emotion words and both depression and personal growth were significant. These results offer some evidence consistent with H3b and H3c. No support was found for H3a; none of the interactions between blog posts per week and positive emotion words were significant.

Overall, the tests of H1 to H3 offer some evidence consistent with the idea that elements of health blogging are associated with improvements in some measures of well-being. The

Table 2. Blogging Frequency and Use of Emotion and Insight Words as Predictors of Changes in Bloggers' Well-being.

	Depression, Time 2			Health uncertainty, Time 2			Personal growth, Time 2			Purpose in life, Time 2		
	β	t	ΔR^2	B	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2
Block 1: Control variables			.73*			.49*			.65*			.60*
Outcome variable at Time 1	.81*	11.73		.60*	6.15		.65*	8.09		.75*	8.42	
Total days blogging	.01	0.10		−.08	−0.88		−.18*	2.19		−.07	−0.82	
Change in health	−.17*	−2.39		−.08	−0.87		.11	1.35		.09	1.03	
Percentage of blog dedicated to health	.07	0.98		.09	0.84		.04	0.49		−.01	−0.14	
Percentage of readers who are friends and family	.17*	2.40		.18	1.73		.22*	2.59		.07	0.75	
Age	.06	0.82		−.03	−0.33		−.01	−0.08		−.04	−0.46	
Education	−.02	−0.31		−.15	−1.58		.12	1.52		.03	0.31	
Gender	−.01	−0.10		−.12	−1.19		−.28*	−3.44		−.08	−0.86	
Block 2: Blog posts per week	.13	1.89	.02	−.17	−1.78	.03	.11	1.38	.01	.11	1.21	.01
Block 3: Word use by bloggers			.01			.06			.004			.02
Positive emotion words	.01	0.14		−.01	−0.11		−.01	−0.10		−.01	−0.13	
Negative emotion words	.10	1.40		.07	0.75		−.06	−0.69		−.13	−1.47	
Insight words	−.02	−0.22		−.25*	−2.66		.04	0.47		.12	1.34	
Block 4: Interactions			.02			.01			.04			.03
Blog posts per week × Positive emotion words	−.03	−0.97		−.04	−0.39		.09	1.04		−.06	−0.71	
Blog posts per week × Negative emotion words	−.17*	−2.08		−.13	−1.19		.22*	2.35		−.02	−0.17	
Blog posts per week × Insight words	−.02	−0.24		.06	0.51		−.04	−0.45		.21*	1.99	

Note: The word use variables (i.e., positive emotion, negative emotion, and insight) reflect the proportion of each word type used relative to all words written by bloggers. All variables in Blocks 2 to 4 were mean centered. Model summaries: depression, $F(15, 54) = 12.66, p < .05, R^2 = .78$; health uncertainty, $F(15, 54) = 5.02, p < .05, R^2 = .58$; personal growth, $F(15, 53) = 8.25, p < .05, R^2 = .70$; purpose in life, $F(15, 53) = 6.80, p < .05, R^2 = .66$.
*$p \leq .05$.

proportion of insight words used by bloggers was associated with decreased health-related uncertainty. Additionally, the significant interactions indicate that, among those bloggers who made relatively more posts, use of insight words was associated with increased perceptions of purpose in life. Among bloggers who made relatively fewer posts, however, use of negative emotion words was associated with increased depression and decreased personal growth. These findings will be further considered in the Discussion section.

Research Questions RQ1 to RQ3: Reader Comments and Blogger Well-Being

RQ1 to RQ3 inquire about the implications of blog reader comments for bloggers' well-being. RQ1 asks whether there is an association between the number of reader comments
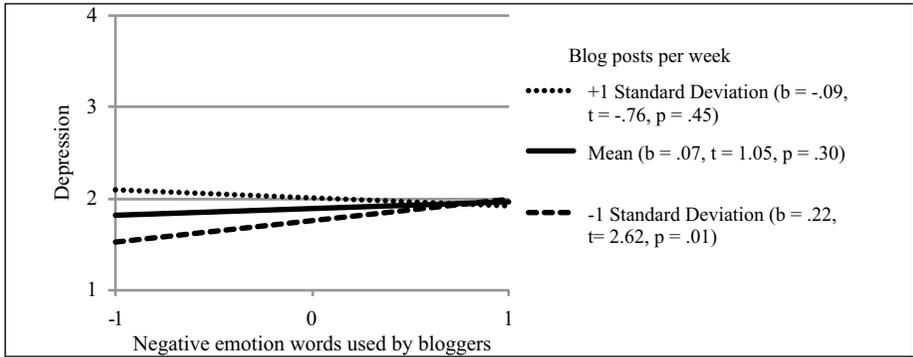
Figure 1. Number of posts made per week by bloggers moderates the relationship between negative emotion words used by bloggers and changes in bloggers' depression.
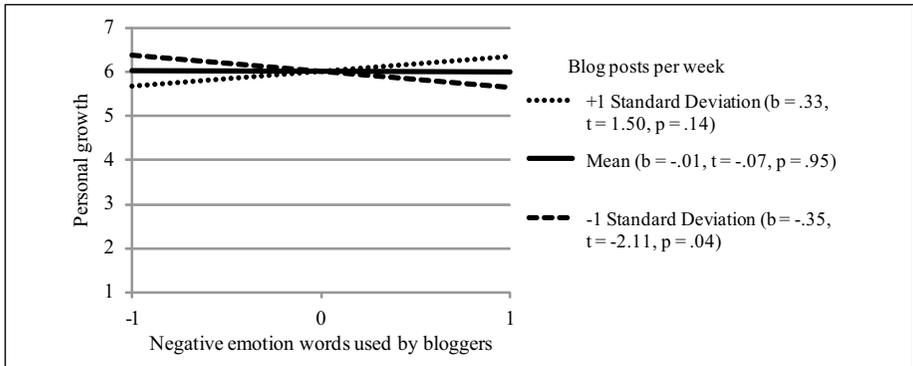Note: Blog posts per week and negative emotion words were mean centered.

Figure 2. Number of posts made per week by bloggers moderates the relationship between negative emotion words used by bloggers and changes in bloggers' personal growth.
Note: Blog posts per week and negative emotion words were mean centered.

per week and bloggers' improvements in well-being. RQ2a to 2c inquire about the relationship between the proportions of positive emotion words, negative emotion words, and insight words written by readers and bloggers' well-being. RQ3a to 3c ask about an interaction between the number of reader comments and the use of positive emotion, negative emotion, and insight words by readers for bloggers' well-being. Again, well-being was operationally defined as depression, health-related uncertainty, personal growth, and purpose in life.

Four regression models were constructed to answer RQ1 to RQ3. All of the models were identical, with the exception of the outcome variables; the outcome variables for the four models consisted of the four measures of respondents' well-being. The measure of the
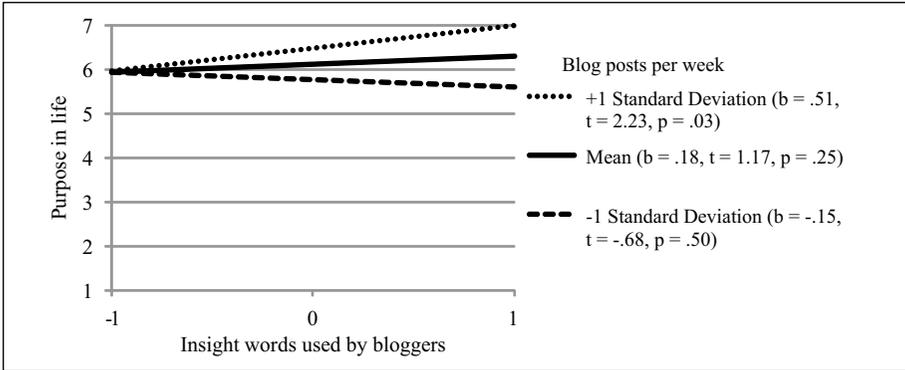
Figure 3. Number of posts made per week by bloggers moderates the relationship between insight words used by bloggers and changes in bloggers' purpose in life.
Note: Blog posts per week and insight words were mean centered.

outcome variable at the time of the initial questionnaire was included in the first block of the models as a control variable along with the other seven previously identified control variables. To account for the variance explained by respondents' blogging behavior, blog posts per week and the proportions of positive emotion words, negative emotion words, and insight words used by bloggers were included in the second block. The third block consisted of the mean number of reader comments per week. The proportions of positive emotion words, negative emotion words, and insight words used in reader comments were included in the fourth block. The fifth and final block of the models consisted of the interactions between reader comments per week and the proportions of positive emotion words, negative emotion words, and insight words used by blog readers. All variables in Blocks 2 to 5 were mean centered (Cohen et al., 2003).

The results (see Table 3) related to RQ1 indicate that there was one significant relationship between the number of comments made per week by readers and the measures of bloggers' well-being. The number of reader comments per week was associated with increased personal growth; however, this finding is qualified by a significant interaction discussed in the following paragraph. The results related to RQ2a to RQ2c demonstrate that only the proportion of positive emotion words used in reader comments was associated with increased depression among bloggers. None of the other relationships involving the proportions of positive emotion words, negative emotion words, or insight words and measures of bloggers' well-being were significant.

One interaction relevant to RQ3a through RQ3c was significant. The interaction between the number of reader comments per week and negative emotion words used in reader comments was significant for bloggers' perceptions of personal growth. This interaction was decomposed using the macros for SPSS developed by Hayes and Matthes (2009). Because the value of −1 standard deviation for reader comments per week was below the range of comments per week observed in the sample, −0.68 standard deviation

Table 3. Reader Comments and Use of Emotion and Insight Words by Readers as Predictors of Changes in Bloggers' Well-being.

	Depression, Time 2			Health uncertainty, Time 2			Personal growth, Time 2			Purpose in life, Time 2		
	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2	β	t	ΔR^2
Block 1: Control variables			.73*			.49*			.65*			.60*
Outcome variable at Time 1	.81*	11.73		.60*	6.15		.65*	8.09		.75*	8.42	
Total days blogging	.01	0.10		−.08	−0.88		−.18*	2.19		−.07	−0.82	
Change in health	−.17*	−2.39		−.08	−0.87		.11	1.35		.09	1.03	
Percentage of blog dedicated to health	.07	0.98		.09	0.84		.04	0.49		−.01	−0.14	
Percentage of readers who are friends and family	.17*	2.40		.18	1.73		.22*	2.59		.07	0.75	
Age	.06	0.82		−.03	−0.33		−.01	−0.08		−.04	−0.46	
Education	−.02	−0.31		−.15	−1.58		.12	1.52		.03	0.31	
Gender	−.01	−0.10		−.12	−1.19		−.28*	−3.44		−.08	−0.86	
Block 2: Blogger behavior			.02			.08*			.02			.03
Blog posts per week	.13	1.84		−.17	−1.88		.12	1.38		.10	1.17	
Positive emotion words—bloggers	.01	0.14		−.01	−0.11		−.01	−0.10		−.01	−0.13	
Negative emotion words—bloggers	.10	1.40		.07	0.75		−.06	−0.69		−.13	−1.47	
Insight words—bloggers	−.02	−0.22		−.25*	−2.66		.04	0.47		.12	1.34	
Block 3: Reader comments per week	−.09	−1.01	.004	.001	0.01	.00	.22*	2.24	.03*	−.04	−0.34	.001
Block 4: Word use by readers			.04*			.003			.01			.03
Positive emotion words—readers	.18*	2.50		.06	0.56		.07	0.80		.11	1.12	
Negative emotion words—readers	−.11	−1.21		.05	0.35		−.13	−1.10		.13	1.10	
Insight words—readers	.10	1.35		−.03	−0.28		−.04	−0.45		.11	1.14	
Block 5: Interactions			.03*			.01			.03			.01
Reader comments per week X Positive emotion words—readers	.08	1.03		.12	1.02		.07	0.73		−.02	−0.15	
Reader comments per week X Negative emotion words—readers	−.20	−1.83		.05	0.32		.32*	2.39		.15	1.02	
Reader comments per week X Insight words—readers	−.06	−0.49		.15	0.77		−.02	−0.14		−.07	−0.39	

Note: The word use variables (i.e., positive emotion, negative emotion, and insight) reflect the proportion of each word type used relative to all words written by bloggers or readers. All variables in Blocks 2 to 5 were mean centered. Model summaries: depression, $F(19, 50) = 12.96$, $p < .05$, $R^2 = .83$; health uncertainty, $F(19, 50) = 3.72$, $p < .05$, $R^2 = .59$; personal growth, $F(19, 49) = 7.13$, $p < .05$, $R^2 = .73$; purpose in life, $F(19, 49) = 5.15$, $p < .05$, $R^2 = .67$.
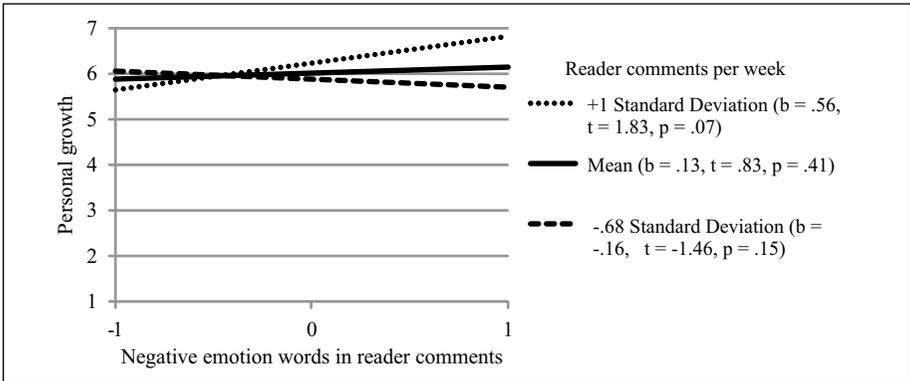*$p \leq .05$.

Figure 4. Number of reader comments made per week moderates the relationship between negative emotion words used in reader comments and changes in bloggers' personal growth.
Note: Reader comments per week and negative emotion words were mean centered. Because −1 standard deviation for reader comments is less than the lower-bound value of the observed number of reader comments, −0.68 standard deviation was used to evaluate the relationship between negative emotion words and personal growth when reader comments were infrequent; this value reflects the fewest number of comments per week reported in the sample (i.e., 0.27).

was used in decomposing the interaction to determine the association when reader comments were relatively infrequent; this value is equivalent to 0.27 reader comments per week, which is the lowest value observed among those blogs that had reader comments. The association between negative emotion words used by readers and bloggers' personal growth was computed at 1 standard deviation above the mean, at the mean, and at 0.68 standard deviation below the mean number of reader comments per week. The results are illustrated in Figure 4. Among those bloggers who had relatively greater numbers of reader comments, the unstandardized regression coefficients suggest that the percentage of negative emotion words in reader comments was associated with increased personal growth among bloggers. The simple slope for this relationship was significant. Among bloggers who had relatively fewer reader comments, the unstandardized regression coefficients suggest that bloggers with a greater percentage of negative emotion words in reader comments reported decreased personal growth. However, the simple slope for this relationship was not significant.

Discussion

The objective of this project was to examine the implications of making public, written disclosures about health via health blogging. Seventy-two respondents who author a blog focusing on their experiences with a health condition completed an initial and follow-up questionnaire about their well-being, and a content analysis of the respondents' blogs was conducted. Though somewhat limited, the results offer evidence that certain forms of expression used by bloggers and their readers are associated with changes in bloggers'

well-being. The findings will be discussed in the following paragraphs along with their practical implications and study limitations.

Bloggers' Writing and Changes in Well-Being

Research examining health blogging has considered issues such as demographic differences among bloggers (Kim & Chung, 2007; Miller & Pole, 2010; Miller et al., 2011), motivations for health blogging (Chung & Kim, 2008), and even the ways in which blogs can be used to understand public health events (Mackert et al., 2011; Tausczik et al., 2012). Although there is some evidence that health blogging is used as a mechanism for coping (Rains & Keating, 2011; Sanford, 2010; Sundar et al., 2007; Tan, 2008), research examining the content of blogger posts and reader comments is relatively scarce (for exceptions, see Chung, 2009; Clarke & van Amerom, 2008; Hoyt & Pasupathi, 2008). The results of this study extend scholarship on health blogging by offering some evidence that the nature of bloggers' writing and readers' responses can be consequential.

The outcomes associated with bloggers' use of insight words were particularly noteworthy. Use of insight words was associated with decreased health-related uncertainty and, among bloggers who posted relatively more frequently, increased purpose in life. The cognitive adaptation explanation for the benefits of expressive writing (Pennebaker, 1997a) suggests that insight words reflect an underlying process in which bloggers are appraising and developing an understanding of their experiences. For example, one blogger wrote, "I could not accept that my legs were not strong anymore. Because of this irrational thinking, I experienced many injuries. Today, I believe that 'acceptance' is better and different from 'giving up'. Perhaps I'm smarter these days." Another blogger noted, "I have no expectations that all will be smooth. I know my illnesses could flare up and new issues and challenges will arise. But I realize that no matter what, I have the ability to cope and move on." These types of posts may have served to help the writers come to a realization about their health condition, and this newfound or ongoing awareness may have improved their understanding of their illness or outlook on life. The findings regarding bloggers' use of insight words are generally consistent with the results of research examining use of insight words in computer-mediated support groups (Lieberman, 2007; Shaw et al., 2006; Shim et al., 2011). Insight words appear to be a relatively valuable indicator of adaptive forms of coping among individuals using computer-mediated platforms to discuss their health problems.

The results associated with negative emotion words were less straightforward. There were significant interactions between blog posts per week and negative emotion words for depression and personal growth. Although use of negative emotion words among bloggers who posted more frequently were associated with increased personal growth and decreased depression, the simple slopes for these relationships were not significant. The exposure-habituation model (Kloss & Lisman, 2002; Lepore, 1997) suggests that negative emotion words signal that a writer is being exposed to aversive stimuli, which over time may serve to mitigate the impact of the stimuli and, ultimately, facilitate improvements in the writer's well-being. It is plausible that bloggers who frequently address their aversive health experiences may more successfully deal with depressive symptomatology and evolve.

One blogger, for example, wrote, "I have good days and bad days, like when fatigue hits me hard or other days where I feel useless or in pain. These ups and downs are part of life and I know it will pass." Yet the results also suggest a cautionary note regarding the use of negative emotion words. Among bloggers who made relatively infrequent posts, the use of negative emotion words was associated with decreased perceptions of personal growth and increased depression. For example, one blogger wrote, "How can I stop this terrifying spiral? I take a pill and cling to my heating pad on the couch. Hating myself." Posting infrequently may allow bloggers to temporarily vent their negative emotions but may not offer enough exposure to encourage habituation.

It is noteworthy that the results of research examining the outcomes of using negative emotion words in computer-mediated support groups are inconsistent. Although Shim et al. (2011) found no main effect for negative emotion words on health outcomes related to well-being, Lieberman and Goldstein (2006) reported that use of negative emotion words explained a significant amount of variance in support group members' self-reports of depression and quality of life. Given that only the percentage of negative emotion words was examined, it may be that the frequency with which these words were written varied across these two studies. Negative emotion words may only be associated with positive outcomes when writers eclipse a minimum threshold of words written.

In sum, blogging behavior appears to have a limited yet meaningful impact on bloggers' well-being. In particular, bloggers' use of insight words were most consistently linked with positive health outcomes. Negative emotion words may, if bloggers post frequently enough, foster positive outcomes, but may also, if bloggers post infrequently, undermine well-being. Positive emotion words were not associated with changes in any of the four outcomes related to well-being. In considering the findings it is worthwhile to note that the control variables explained substantial amounts of variance in the four outcome variables. This is the result of the lagged dependent variables (i.e., the outcome variable at the first measurement point); the other control variables explained relatively little variance in the four outcomes.

Reader Comments and Bloggers' Well-Being

Health blogs are novel in that, as a public form of writing, they may be read and commented on by a blogger's online and offline social networks. Readers may serve as a resource for social support by posting comments that communicate comfort or advice. The results of this study demonstrate that the frequency and content of reader comments can have consequences for bloggers' well-being above and beyond bloggers' written expression. The number of reader comments was associated with bloggers' increased personal growth. At a general level, reader comments may have served as positive feedback and signaled to bloggers that their writing was consequential, leading bloggers to feel that they were evolving as a result of their illness experiences. Additionally, there was an interaction between the number of reader comments and negative emotion words used by readers for bloggers' feelings of personal growth; for those bloggers whose readers commented more

frequently, readers' use of negative emotion words was associated with increased personal growth among bloggers. As indicators of emotional support, negative emotion words used by readers may have served to highlight the progress made by bloggers as a result of their experiences. For example, one reader commented, "I thought I was reading about myself. You cry, laugh, and live in abject fear one second and then you are great the next. You instantly get an ache or pain, and think the very worst that cancer has spread. You do all these crazy things you mentioned." In response to one blogger's post about frustration, another reader wrote, "I am completely overwhelmed by this post. Your anger and rage is absolutely powerful and refreshing."

Counter to what might be expected, readers' use of positive emotion words was related to increases in bloggers' depression. Positive emotion words should signal positive feedback in the form of emotional support, such as when one reader wrote, "Your blog always inspires me and you have such courage!" This result may be an artifact of bloggers' feelings of depression spurring readers' use of positive emotion words. It seems plausible that readers were attuned to increases in bloggers' feelings of depression and thus responded with positive emotion words that might be found in messages of care and encouragement. Relative to the other two categories, positive emotion words appeared to be integral to reader comments. Over 6% of the words written by readers—twice the amount of the other two categories—were positive emotion words. It may be the case that the primary focus of health blog readers, or at least their first response, is to encourage bloggers to maintain a positive outlook.

Although limited, it is important to note that the findings regarding reader comments represent the impact of reader comments above and beyond the variance explained by bloggers' behavior (i.e., blog posts per week, percentage of positive emotion words used by bloggers, etc.). At a basic level, these results underscore the notion that there is a social dimension to blogging that has implications for the blogger and his or her writing. Research applying theory from the expressive writing paradigm to understand the outcomes of certain forms of expression in computer-mediated support groups (e.g., Lieberman, 2007; Shim et al., 2011) has focused almost exclusively on the person making the disclosures. The results of this project suggest that the responses of the writer's audience are also important to consider. Readers' comments had limited but potentially noteworthy consequences for bloggers' well-being in the form of personal growth. More generally, the results of this study offer some evidence to suggest that bloggers' illness experiences were coconstructed in part by reader feedback.

Practical Implications

Although several authors have discussed the potential therapeutic benefits of blogging (Nagel & Anthony, 2009; Tan, 2008), relatively little empirical research has examined outcomes associated with blogging about health. Given that the data examined in this project are from a relatively small number of dedicated bloggers, the findings should be considered as tentative. Keeping that in mind, the results offer a few

insights about what might lead blogging to be more or less likely to result in positive health outcomes.

First, in order to achieve benefits, the results of this project suggest that bloggers must make relatively frequent posts. Several of the findings regarding specific forms of expression were contingent upon the number of posts made by bloggers. Bloggers who posted more frequently were, in general, more likely to achieve health benefits. For reference, bloggers who were 1 standard deviation above the mean wrote approximately 5 posts per week. Blogging infrequently may actually be counterproductive—particularly among individuals who focus on negative emotions associated with health-related experiences. Second, most of the findings regarding positive outcomes associated with specific forms of expression involved insight words. Accordingly, bloggers might be encouraged to focus on understanding and making sense of their health experiences. Finally, although the findings related to the effects of reader comments above and beyond bloggers' writing were relatively small, they suggest that readers should not be overlooked. Simply having readers posting comments (assuming that they are not blatantly unsupportive) might be sufficient to validate bloggers and encourage them to continue blogging.

More broadly, the findings from this study suggest some value in adapting ideas from the expressive writing paradigm—which has been applied as a clinical intervention (Pennebaker, 2010)—to explore more naturalistic forms of writing made possible by new communication technologies. Blogging is different from expressive writing interventions in important ways. Whereas health blogging consists of a publicly disclosed ongoing narrative about a continuing stressor, expressive writing interventions are private and generally limited to between three and five 30-minute sessions about a single traumatic experience. Yet blogging is similar to the expressive writing paradigm in that health bloggers are articulating their experiences with a significant stressor in writing. As illustrated by the findings from this study, it seems reasonable that some of the underlying mechanisms responsible for improvement from expressive writing might extend to informal and ongoing written disclosure about stressors. The findings also have implications for the expressive writing paradigm and clinical interventions involving expressive writing. The results suggest that expressive writing might not need to be conducted privately and with the knowledge that one's writing will not be shared. It seems possible that, in some instances, writing in public may even produce additional health benefits by offering access to social support.

Limitations

Three potential limitations of this study warrant consideration. First, the absolute sample size for this project was relatively small and the majority of respondents were female. Considerations of sample size and respondent demographics should be made in light of the fact that a panel design was used and respondents consisted of people who are suffering from and blogging about significant health conditions. Although a larger and more diverse (in regard to gender) sample would be desirable, the current sample is reasonable given

the preceding parameters. Second, although a mean of almost 8 weeks elapsed between the two measurement points, this amount of time is relatively small in comparison with the amount of time that respondents had been blogging about their health experiences. The analyses conducted in this study are based on only a fraction of the total time that respondents have been blogging. Nonetheless, the significant associations reported in this study suggest that, despite the somewhat limited time frame, blogging behavior and reader responses predicted improvements in several dimensions of bloggers' well-being. Finally, the bloggers in the sample live with and write about a wide range of health conditions. Although diversity among health conditions is important for increasing the generalizability of the findings, it seems possible that blogging may be more or less beneficial for specific types of conditions. Future research might consider the consequences of factors such as whether a condition is rare, stigmatizing, or terminal for the outcomes of health blogging.

Conclusion

Communication technologies offer a number of opportunities for people coping with illness to publicly share their experiences with others. This project examined the implications of using one such technology and explored the implications of making public, written disclosures about health in the context of a health blog. The results add to the growing body of scholarship examining health blogging by offering some evidence that the nature of bloggers' writing and readers' comments are consequential. Certain forms of expression by bloggers and readers were associated with improvements in bloggers' well-being. Yet future research is essential to more fully understand health blogging and, more generally, the implications of using Internet-based technologies to communicate about health.

References

Albrecht, T. L., & Goldsmith, D. J. (2003). Social support, social networks, and health. In A. Dorsey, K. I. Miller, R. Parrott, & T. Thompson (Eds.), *Handbook of health communication* (pp. 263-284). Mahwah, NJ: Lawrence Erlbaum.

Beck, A. T., & Alford, B. A. (2009). *Depression: Causes and treatment* (2nd ed.). Philadelphia: University of Pennsylvania Press.

Bender, J. L., Jimenez-Marroquin, M.-C., & Jadad, A. R. (2011). Seeking support on Facebook: A content analysis of breast cancer groups. *Journal of Medical Internet Research, 13*, e16.

Braithwaite, D. O., Waldron, V. R., & Finn, J. (1999). Communication of social support in computer-mediated groups for people with disabilities. *Health Communication, 11*, 123-151.

Buis, L. R., & Carpenter, S. (2009). Health and medical blog content and its relationships with blogger credentials and blog host. *Health Communication, 24*, 703-710.

Burleson, B. R. (2009). Understanding the outcomes of supportive communication: A dual-process approach. *Journal of Social and Personal Relationships, 26*, 21-38.

Centers for Disease Control and Prevention. (2009). *FastStats: Leading causes of death*. Retrieved from http://www.cdc.gov/nchs/fastats/lcod.htm

Chung, C. K. (2009). *Predicting weight loss in blogs using computerized text analysis.* Unpublished doctoral dissertation, University of Texas at Austin, Austin, TX.

Chung, D. S., & Kim, S. (2008). Blogging activity among cancer patients and their companions: Uses, gratifications, and predictors of outcomes. *Journal of the American Society for Information Science and Technology, 59*, 297-306.

Clarke, J., & van Amerom, G. (2008). A comparison of blogs by depressed men and women. *Issues in Mental Health Nursing, 29*, 243-264.

Cohen, J., Cohen, P., West, S. G., & Aiken, L. S. (2003). *Applied multiple regression/correlation analysis for the behavioral sciences* (3rd ed.). New York, NY: Routledge.

Cohen, S., & Wills, T. A. (1985). Stress, social support, and the buffering hypothesis. *Psychological Bulletin, 98*, 310-357.

Coursaris, C. K., & Liu, M. (2009). An analysis of social support exchanges in online HIV/AIDS self-help groups. *Computers in Human Behavior, 25*, 911-918.

Cutrona, C. E., & Russell, D. (1987). The provisions of social relationships and adaptation to stress. In W. H. Jones & D. Perlman (Eds.), *Advances in personal relationsh*ips (pp. 37-67). Greenwich, CT: JAI Press.

Frattaroli, J. (2006). Experimental disclosure and its moderators: A meta-analysis. *Psychological Bulletin, 132*, 823-865.

Goldsmith, D. J. (2004). *Communicating social support*. New York, NY: Cambridge University Press.

Harmon, J. L., Barroso, J., Pence, B. W., Leserman, J., & Salahuddin, N. (2007). Demographic and illness-related variables associated with HIV-related fatigue. *Journal of the Association of Nurses in AIDS Care, 19*, 90-97.

Hayes, A. F., & Matthes, J. (2009). Computational procedures for probing interactions in OLS and logistic regression: SPSS and SAS implementations. *Behavior Research Methods, 41*, 924-936.

Herring, S. C., Scheidt, L. A., Bonus, S., & Wright, E. (2004). *Bridging the gap: A genre analysis of weblogs.* Proceedings of the 37th Annual Hawaii International Conference on System Sciences (HICSS'04). Los Alamitos, CA: IEEE Press.

Hoyt, T., & Pasupathi, M. (2008). Blogging about trauma: Linguistic markers of apparent recovery. *E-Journal of Applied Psychology, 4*, 56-62.

Keating, D. M. (2012). Spirituality and support: A descriptive analysis of online social support for depression. *Journal of Religion and Health.* Advanced online publication.

Kim, S. (2009). Content analysis of cancer blog posts. *Journal of the Medical Library Association, 97*, 260-266.

Kim, S., & Chung, D. S. (2007). Characteristics of cancer blog users. *Journal of the Medical Library Association, 95*, 445-450

Kloss, J. D., & Lisman, S. A. (2002). An exposure-based examination of the effects of written emotional disclosure. *British Journal of Health Psychology, 7*, 31-46.

Kohout, F. J., Berkman, L. F., Evans, D. A., & Cornoni-Huntley, J. (1993). Two shorter forms of the CES-D depression symptoms index. *Journal of Aging and Health, 5*, 179-193.

Kulik, J. A., & Mahler, H. I. M. (1993). Emotional support as a moderator of adjustment and compliance after coronary artery bypass surgery: A longitudinal study. *Journal of Behavioral Medicine, 16*, 45-63.

Lagu, T., Kaufman, E. J., Asch, D. A., & Armstrong, K. (2008). Content of weblogs written by health professionals. *Journal of General Internal Medicine, 23*, 1642-1646.

Lenhart, A., & Fox, S. (2006). *Bloggers: A portrait of the Internet's new storytellers*. Retrieved from http://www.pewinternet.org

Lepore, S. J. (1997). Expressive writing moderates the relation between intrusive thoughts and depressive symptoms. *Journal of Personality and Social Psychology, 73*, 1030-1037.

Lepore, S. J., Greenberg, M. A., Bruno, M., & Smyth, J. M. (2002). Expressive writing and health: Self-regulation of emotional-related experience, physiology, and behavior. In S. J. Lepore & J. M. Smyth (Eds.), *The writing cure: How expressive writing promotes health and emotional well-being* (pp. 99-117). Washington, DC: American Psychological Association.

Lepore, S. J., & Smyth, J. M. (Eds.). (2002). *The writing cure: How expressive writing promotes health and emotional well-being*. Washington, DC: American Psychological Association.

Lieberman, M. (2007). The role of insightful disclosure in outcomes for women in peer-directed breast cancer groups: A replication study. *Psycho-Oncology, 16*, 961-964.

Lieberman, M. A., & Goldstein, B. A. (2006). Not all negative emotions are equal: The role of emotional expression in online support groups for women with breast cancer. *Psycho-Oncology, 15*, 160-168.

Mackert, M., Love, B., Donovan-Kicken, E., & Uhle, K. A. (2011). Health literacy as controversy: An online community's discussion of the U.S. Food and Drug Administration acetaminophen recommendations. *Qualitative Health Research, 21*, 1607-1617.

Miller, E. A., & Pole, A. (2010). Diagnosis blog: Checking up on health blogs in the blogosphere. *American Journal of Public Health, 100*, 1514-1519.

Miller, E. A., Pole, A., & Bateman, C. (2011). Variation in health blog features and elements by gender, occupation, and perspective. *Journal of Health Communication, 16*, 726-749.

Mishel, M. H. (1981). The measurement of uncertainty in illness. *Nursing Research, 30*, 258-263.

Nagel, D. M., & Anthony, K. (2009). Writing therapy using new technologies—the art of blogging. *Journal of Poetry Therapy, 22*, 41-45.

Nardi, B. A., Schiano, D. J., & Gumbrecht, M. (2004). Blogging as social activity, or, would you let 900 million people read your diary? *In Proceedings of the 2004 ACM Conference on Computer Supported Cooperative Work* (pp. 222-231). Chicago, IL: ACM.

Pennebaker, J. W. (1993). Putting stress into words: Health, linguistic, and therapeutic implications. *Behaviour Research and Therapy, 31*, 539-548.

Pennebaker, J. W. (1997a). *Opening up: The healing power of expressing emotions*. New York, NY: Guildford.

Pennebaker, J. W. (1997b). Writing about emotional experiences as a therapeutic process. *Psychological Science, 8*, 162-166.

Pennebaker, J. W. (2010). Expressive writing in a clinical setting. *The Independent Practitioner, 30*, 23-25.

Pennebaker, J. W., Booth, R. J., & Francis, M. E. (2007). *Linguistic inquiry and word count: LIWC2007*. Austin, TX: LIWC.net.

Pennebaker, J. W., Chung, C. K., Ireland, M., Gonzales, A., & Booth, R. J. (2007). *The development and psychometric properties of LIWC2007*. Austin, TX: LIWC.net.

Pennebaker, J. W., Mayne, T. J., & Francis, M. E. (1997). Linguistic predictors of adaptive bereavement. *Journal of Personality and Social Psychology, 72*, 863-871.

Radloff, L. S. (1977). The CES-D scale: A self-report depression scale for research in the general population. *Applied Psychological Measurement, 1*, 385-401.

Rains, S. A., & Keating, D. M. (2011). The social dimension of blogging about health: Health blogging, social support, and well-being. *Communication Monographs, 78*, 511-534.

Rains, S. A., & Young, V. (2009). A meta-analysis of research on formal computer-mediated support groups: Examining group characteristics and health outcomes. *Human Communication Research, 35*, 309-336.

Ryff, C. D. (1989). Happiness is everything, or is it? Explorations on the meaning of psychological well-being. *Journal of Personality and Social Psychology, 57*, 1069-1081.

Ryff, C. D., & Singer B. (1998). The role of purpose in life and positive human health. In P. T. P. Wong & P. S. Fry (Eds.), *The human quest for meaning: A handbook of psychological research and clinical applications* (pp. 213-235). Mahwah, NJ: Lawrence Erlbaum.

Sanford, A. A. (2010). "I can air my feelings instead of eating them": Blogging as social support for the morbidly obese. *Communication Studies, 61*, 567-584.

Schaefer, C., Coyne, J. C., & Lazarus, R. S. (1981). The health-related functions of social support. *Journal of Behavioral Medicine, 4*, 381-406.

Shaw, B. R., Hawkins, R., McTavish, F., Pingree, S., & Gustafson, D. H. (2006). Effects of insightful disclosure within computer mediated support groups on women with breast cancer. *Health Communication, 19*, 133-142.

Shim, M., Cappella, J. N., & Han, J. Y. (2011). How does insightful and emotional disclosure bring potential health benefits? Study based on online support groups for women with breast cancer. *Journal of Communication, 61*, 432-454.

Stefanone, M. A., & Jang, C. Y. (2008). Writing for family and friends: The interpersonal nature of blogs. *Journal of Computer-Mediated Communication, 13*, 123-140.

Sundar, S. S., Edwards, H. H., Hu, Y., & Stavrositu, C. (2007). Blogging for better health: Putting the "public" back in public health. In M. Tremayne (Ed.), *Blogging, citizenship, and the future of media* (pp. 83-102). New York, NY: Routledge.

Tabachnick, B. G., & Fidell, L. S. (2001). *Using multivariate statistics* (4th ed.). Boston, MA: Allyn and Bacon.

Tan, L. (2008). Psychotherapy 2.0: MySpace blogging as self-therapy. *American Journal of Psychotherapy, 62*, 143-163.

Tausczik, Y., Faasee, K., Pennebaker, J. W., & Petrie, K. J. (2012). Public anxiety and information seeking following the H1N1 outbreak: Blogs, newspaper articles, and Wikipedia visits. *Health Communication, 27*, 179-185.

Wright, K. B., & Bell, S. B. (2003). Health-related support groups on the Internet: Linking empirical findings to social support and computer-mediated communication theory. *Journal of Health Psychology, 8*, 39-54.

Author Biographies

Stephen A. Rains (PhD, University of Texas at Austin) is an Associate Professor in the Department of Communication at the University of Arizona.

David M. Keating (MA, Michigan State University) is a doctoral student in the Department of Communication at Michigan State University.