

Personality traits and dysfunctional construal of online health promotion messages

Yaeun Lee¹  · John E. Kurtz²

Received: 8 May 2017 / Accepted: 4 October 2017 / Published online: 20 October 2017
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Abstract

Purpose With the Internet becoming increasingly popular as a source of information, blogs offering healthy lifestyle techniques and knowledge have become popular and accessible. Despite their focus on health, these blogs portray content that may be negatively construed by viewers, especially those with or at risk for eating disorders. The present study investigated changes in affect and self-esteem after viewing a prototypic health blog. Personality traits, specifically neuroticism and conscientiousness, were also investigated. **Methods** A prototypic health blog was constructed after extensive review of existing blogs. A parallel format was then followed to create a home décor website for a control condition. Female undergraduate students were randomly assigned to one of two blog sites, and participants completed an earlier personality assessment and post-viewing study questionnaires.

Results Contrary to the hypothesis that readers of the health blog will report more negative outcomes, no main effect of blog condition was found. However, individuals high in trait neuroticism experienced greater differences in negative affect, but not self-esteem, when viewing the health blog versus the control blog.

Conclusions This study found that viewing health blogs did not have immediate effects on affect and self-esteem, but more neurotic individuals were more inclined to experience negative affect when viewing health promotion messages. Personality traits assessed prior to the experiment were more predictive of negative affect and self-esteem during the experiment than blog viewing conditions. No level of evidence, experimental study.

Keywords Health blogs · Personality · Neuroticism · Conscientiousness · Negative affect · Self-esteem

Introduction

Body dissatisfaction has been found as a primary cause of eating disorders and as a potential contributor to various health behaviors, such as decreased success in smoking cessation [1], lower health-related quality of life [2], and poor psychological health, such as depression and low self-esteem [3–8]. Across movies, magazines, and television, the ideal thin image of females is often emphasized and praised [9]. However, with recent developments in technology and the predominant role of the Internet in everyday life, research in body image has shifted from a focus on mass media to social media.

As social network sites and individual websites have become abundant, weblogs, commonly known as blogs, have also grown in popularity. Blogs provide a new form of online interaction where users can come together to share opinions or analysis about various events and issues [10]. One particular type of websites, commonly known as pro-eating disorder (ED) blogs, encourage EDs and extreme thinness and advocate these as lifestyle choices rather than illnesses [11]. They offer tips and tricks on

✉ Yaeun Lee
leeyae@isu.edu

John E. Kurtz
john.kurtz@villanova.edu

¹ Department of Psychology, Idaho State University, 626 Garrison Hall, 921 S 8th Avenue, Pocatello, ID 83209, USA

² Department of Psychology, Villanova University, 320 Tolentine Hall, 800 E. Lancaster Avenue, Villanova, PA 19086-1699, USA

how to lose weight quickly and without detection, and commonly depict pictures of both emaciated women and morbidly obese women as further motivational stimuli for losing weight.

To investigate how exposure to these websites affects an individual, Bardone-Cone and Cass [12] constructed a prototypic pro-ED blog to experimentally manipulate exposure to female undergraduates. The prototypic blog was created by the researchers after an extensive review of existing pro-ED websites and reflected the most common themes and features depicted in pro-ED sites. Two comparison websites were created following a similar format with one on female fashion, but with images of average-sized women, and one on home décor as an appearance-neutral site. The visual layouts of both websites were identical, and all sites had the same number of links and similar amounts of text and images. Components of each website were kept as similar as possible, such as having photo galleries in each of the sites.

The study found that the female participants who were exposed to the pro-ED website experienced greater negative affect (NA), lower social self-esteem (SE), and lower appearance self-efficacy compared to those who viewed control sites focused on fashion or home décor [12]. These women also saw themselves as heavier and reported thinking about their appearance and comparing themselves to others much more than those exposed to the other two blogs. Interpersonal perfectionism was also analyzed as a potential moderator by the researchers. Results indicated that high perfectionists experienced greater NA and perceived themselves as more overweight than low perfectionists in the pro-ED condition. Although these findings suggest that individual characteristics play a role in differences in the processing of the same information, one must be cautious in interpreting these results as a similar study from the same research group recently found no effects from viewing pro-ED websites [13].

Centered on the goal of offering healthy lifestyle techniques and knowledge, a different type of blog, known as health blogs, have become more popular and accessible [14]. Unlike pro-ED blogs, these health blogs emphasize bodies that are healthy and fit, but still thinner than what most individuals can achieve. These blogs offer personal stories and experiences of exercise, nutrition, and weight management, and are often utilized by the viewers as a tool for their own lifestyle changes. Accounts of weight loss and body transformation are common topics in many of these blogs. The bloggers share their own trials and successes with weight loss, often including sensational before-and-after pictures. Additionally, popular health blogs are often sponsored by major corporations, such as Reebok. The blog creators also author health-related books and are often viewed by the media as health experts, regardless of formal education or certification.

Despite their general focus on healthy eating and exercise, these health blogs may portray content that may be potentially problematic for some viewers. In a content analysis of a selection of 21 popular health blogs, Boepple and Thompson [15] found a heavy emphasis on appearance, especially thinness, and maladaptive messages in regard to diet. For instance, some common themes found amongst the blogs were comments praising or positively regarding being thin (e.g., “got married as a glorious, size 4, 110 pound beauty”), fat/overweight stigmatizing language (e.g., a blogger mentioned that she kept getting “fatter” after pregnancy and believed she would stay fat forever), and negative or guilt-inducing messages about food (e.g., a post on how the blogger could eat a lot of vegetables and feel content without feeling the “icky, overly stuffed and lethargic feeling” that comes from having “traditional family meals”). In addition, out of the 21 blogs selected for analysis, 5 blog authors reported an eating disorder in the past, and 6 mentioned menstruation or fertility problems. The thin idealization, stigma about weight, and negative food messages depicted in the blogs may serve to normalize unhealthy attitudes and behaviors under the guise of health promotion. The mere fact that these blogs may seem positive can be troublesome as they can reach a wider audience with their potentially negative influences undetected.

Although most health blogs contain many messages regarding eating and appearance, not every individual is influenced by the thin-ideal media in the same negative way. Research has consistently shown that individual differences, specifically personality traits, are a prominent factor in health [16]. The five-factor model of personality (FFM) is a widely accepted taxonomy of a hierarchical organization of personality traits in terms of five dimensions: extraversion, agreeableness, conscientiousness, neuroticism, and openness to experience [17].

Specific traits have been empirically linked with various health outcomes, such as diagnoses of mental disorders [18]. With respect to eating disorders, specifically, studies have found neuroticism as the most consistently associated trait with an eating disorder diagnosis [19]. The trait has also been investigated and supported as an associated factor with eating disorder symptoms in the non-clinical population [20]. In relation to health behaviors, such as diet and exercise, a study looking at binge eating and alcohol abuse in college students found neuroticism to be positively associated with both behaviors [21]. These findings were further confirmed in an investigation of the FFM with nonsuicidal self-injury and other excessive or potentially addictive behaviors. Individuals who scored higher on neuroticism, with lower scores on agreeableness and conscientiousness, had significantly greater rates of self-injury, alcohol and drug abuse, dysfunctional eating, sexual compulsivity, and problems in interpersonal relationships [22].

More recently, Keller and Siegrist [23] assessed the FFM traits, eating styles, and food choices of more than 500 individuals of 18 years of age or older in Switzerland. Eating styles were differentiated between restrained (consciously restricting food intake), emotional (responding to emotions and stress by eating), and external (eating when external food cues are present). Significant effects of personality on eating styles and food choices were found. Neuroticism was positively associated with restrained, emotional, and external eating styles and consumption of sweet and savory food. In contrast, conscientiousness was positively associated with restrained eating, but negatively with emotional and external eating. Furthermore, the conscientious trait had a significant positive effect on fruit and vegetable consumption and a negative effect on sweet and savory, meat, and sweetened drinks intake. Overall, neuroticism was positively associated with unhealthy eating habits, and conscientiousness with healthy eating behaviors.

Prior studies support these claims by suggesting that neurotic and emotionally unstable individuals are vulnerable to counter-regulatory emotional eating and to highly caloric sweet and savory foods, thought to be to cope with negative moods [24]. On the other hand, highly conscientious individuals seem to display regulatory restrained eating and less counter-regulatory emotion and external eating, thus adhering to a healthy and balanced diet [25]. Prior studies further suggest the conscientiousness trait as being a good indicator of various health behaviors. In a study investigating personality traits and health-related behaviors, problems, and beliefs in about 600 college students, Raynor and Levine [26] found conscientiousness as the most consistently associated trait with a health-promoting lifestyle. Highly conscientious individuals were more likely to wear seat belts, control their consumption of alcohol, exercise, get enough sleep, and consume fruits and vegetables. They were also less likely to indulge in cigarettes and alcohol or to binge drink.

Despite the proliferation of health blogs, no study to date has experimentally manipulated exposure to a health blog and assessed its effects. With these limitations and prior findings in mind, the current study aimed to address these gaps by assessing personality traits and differences in affect and SE at post-blog exposure between two groups who either viewed a health blog based on popular media or a neutral blog about home décor and design.

The current study advanced the following hypotheses:

Hypothesis 1 (a) Individuals exposed to the health blog will report greater NA compared to those who view the control blog. (b) High neuroticism will accentuate the differences in NA between blog conditions compared to lower neuroticism. (c) Low conscientiousness will accentuate the differences in NA between blog conditions compared to higher conscientiousness.

Hypothesis 2 (a) Individuals in the health blog condition will report lower SE compared to those in the control condition. (b) High neuroticism will accentuate the differences in SE between blog conditions compared to lower neuroticism. (c) Low conscientiousness will accentuate the differences in SE between blog conditions compared to higher conscientiousness.

Methods

Participants

One hundred and forty-eight female undergraduate students ($N = 148$) were recruited online to participate in the study in return for course credit. To participate in the study, students were required to have already completed a pre-screening assessment available online to obtain trait assessments. Participants ranged in age from 18 to 22 ($M = 18.83$, $SD = 0.94$), with 60.1% reporting as freshmen ($N = 89$), 25.7% as sophomores, 11.5% as juniors, and 2.7% as seniors. Ethnically, 75.0% ($N = 108$) of the subjects were identified as White, 7.6% as Asian, 6.9% as Black, 5.6% as Hispanic, and 4.9% as other.

Materials

The blogs

A prototypic health blog was created by the author based upon a content analysis of 21 blogs presented by Boepple and Thompson [15]. Content found to be thematically consistent throughout the majority of the blogs was used as the foundation for the health blog. The resulting health blog consisted of an ‘About’ section where the faux-blogger introduced herself and her blog, along with a bottom section asking readers to submit their questions and comments. A ‘Recipes’ section containing various healthy recipes, a ‘Workouts’ section with different exercise routines to achieve different goals, such as “arms like Victoria Secret’s Angels,” and a “Tidbits” section of tips from the blogger on how to stay motivated on clean-eating and exercise were included. Lastly, a “FAQ” page of 6 different questions commonly asked by readers from the 21 blogs mentioned above were added.

A control blog was created based on the format and content of the health blog. The control blog covered topics regarding modern interior design and do-it-yourself projects, such as how to decorate a dorm room. The visual layout of the design blog was identical to the layout of the health blog, with the same number of links and about the same amount of text and number of images.

Feedback on the blog

To ensure that the participants were paying attention to the blog, prior to exposure to the blog, they were informed of a short survey that would be used to gather feedback. It was administered immediately following completion of their reading. Specific questions regarding the blogger (e.g., “What do you remember about the blog creator? Can you describe her?”) to thoughts on specific posts (e.g., “What was your favorite recipe? Why?” for the health blog condition; “What was your favorite Canvas DIY project? Why?” for the control blog condition) will be asked. Comments regarding the blog structure (e.g., “Was the blog easy to navigate and scroll through? If not, what was the issue?”) and the possible popularity of the website (e.g., “Would you show this blog to your friends? Do you think your friends would enjoy this blog?”) were additionally asked. Different surveys were given to the two conditions to relate to the different content in the blogs.

Personality assessment

The Big Five Inventory (BFI; [27]) was used to assess basic personality traits of the participants. This instrument consists of 44 items that measure personality factors according to the five-factor model: extraversion, agreeableness, conscientiousness, neuroticism, and openness. The items consist of a short phrase (e.g., is talkative) that are based on prototypical traits of each personality factor. Each item is rated with a 5-point response format, with 1 labeled “disagree strongly” and 5 labeled “agree strongly.” Alpha reliabilities of 0.75–0.80 have been reported for the scales, along with a 0.80–0.90 for 3-month test–retest reliabilities [27]. The alpha values for the current study were 0.75 for extraversion, 0.75 for agreeableness, 0.74 for conscientiousness, 0.70 for neuroticism, and 0.79 for openness.

Affect

Post-blog affect was assessed with the Positive and Negative Affect Schedules (PANAS; [28]). The measure consists of two 10-item mood scales: positive affect (PA) and negative affect (NA). Participants are asked to rate the extent of a particular emotion within a given time period on a 5-point response format, with 1 labeled “very slightly or not,” 3 “moderately,” and 5 “very much.” The current study adopted the time frame: “after viewing the website.” The PANAS is a widely used instrument in studies investigating state affect in a variety of time frames. Prior studies have confirmed good reliability of the PANAS, with average Cronbach’s alpha of 0.89 for PA and 0.85 for NA, along with evidence of strong construct validity [28, 29]. The alpha values for the current study were 0.87 for PA and 0.81 for NA.

Self-esteem

State SE levels after blog exposure were measured using the Rosenberg Self-Esteem Scale (RSE; [30]), one of the most commonly used and best-validated measures of SE [31]. Each of the 10 items on the RSE is a general statement about how one feels about oneself (e.g., “On the whole, I am satisfied with myself.”). Each item is rated on a 4-point response format, ranging from 1 (“strongly disagree”) to 4 (“strongly agree”), indicating how accurately the item describes the individual. The scale has shown high alpha reliability in various studies, with a range of 0.83–0.86 [32]. The alpha value for the current study was 0.86.

Procedure

Screen

Participants completed the BFI online as part of the screening assessment offered to students at the start of either the fall or spring semester. Only those who finished the BFI were eligible to participate in the proposed study. Each participant was scheduled for an individual session to receive instructions about the study’s procedures, give consent for participation, and complete the demographic questionnaire. Students were told that the study was interested in consumer feedback on specific blogs for marketing research purposes. This was told to blind the participants to the exact nature and reduce demand effects of the study.

Exposure

Once the participant gave consent and completed the demographics form, she was randomly assigned to be exposed to either the health blog ($N=75$) or the control blog ($N=73$). No significant differences in BFI scores were found across the conditions. The participants were then asked to actively view the blog and advance through all the different sub-categories and posts. A total time of 15 min was given for thorough exposure. To ensure that the participant was engaging with the blog, she was asked to reply to the blogger’s request for comments and questions with her own free responses. This response was submitted through an anonymous response section in the blog. Participants were also told that specific feedback about the viewed blog will be asked after exposure to ensure active viewing.

Post-questionnaires

After 15 min of exposure, the participants were asked to first complete a feedback questionnaire, then the PANAS and RSE. To avoid confounding due to order effects, different orders of administration for the PANAS and RSE were

counterbalanced across blog conditions. Upon completion of the post-questionnaires, the participants were debriefed with the study’s actual aims of studying the effects of blogs on an individual’s emotions and thoughts.

Results

Two independent samples *t* tests were conducted to compare mean scores on NA and SE between the two blog viewing conditions. The results are presented in Table 1. No significant differences were found between the control and health conditions for either outcome variable, NA and SE, which fails to support Hypotheses 1a and 2a, respectively.

Significant departures from normality were observed in the distribution of NA scores, so Spearman’s ρ correlations were computed between the five BFI scores, NA, and SE. These ρ coefficients are reported in Table 2. Significant correlations ($p < 0.01$) were found between the neuroticism trait and both outcome variables; individuals with higher neuroticism scores at the screening reported higher NA and lower SE later, after viewing the blogs at the experiment. The conscientiousness trait was significantly correlated with SE ($p = 0.035$); individuals with higher conscientiousness scores reported higher SE after blog viewing. Among the other three traits, only agreeableness was found to be significantly ($p = 0.013$) and positively correlated with SE.

The remaining study hypotheses were tested with a series of four hierarchical multiple regression analyses. There were no significant outliers in the data; all Cook’s *D* values were less than 1 (range 0.00–0.74) and Mahalanobis distance values did not yield probability less than 0.001 (mean 0.342, minimum 0.007) across the 148 cases. Standardized residuals from the four models were uncorrelated with the independent variables. Durbin–Watson coefficients were very close to 2.0 across the four models (range 1.90–2.11), indicating a minimal degree of autocorrelation. Dummy-codes for the blog viewing condition variable were created in which the cases in the health blog viewing condition were coded 1 and the cases in the control blog viewing condition were coded 2. To test Hypothesis 1b, a moderated multiple regression analysis was conducted with NA scores as the dependent variable. The moderator variable, centered BFI Neuroticism scores, and

Table 2 Spearman’s ρ correlations between BFI traits and outcome variables

	Negative affect	Self-esteem
Neuroticism	0.24**	–0.33**
Extraversion	–0.08	0.14
Openness	0.14	0.03
Agreeableness	–0.07	0.21*
Conscientiousness	–0.11	0.17*

N = 148

BFI Big Five Inventory

* $p < 0.05$, ** $p < 0.01$

the dummy-coded blog condition variable were entered simultaneously at step one of the hierarchical equation. The product interaction term (centered Neuroticism score multiplied by dummy-coded blog condition variable) was entered at step two. Hypothesis 1b was supported by a significant interaction effect between neuroticism and blog condition for NA (F -change = 4.24, $\Delta R^2 = 0.03$, $p < 0.05$). Neuroticism was more highly correlated with NA among individuals who viewed the health blog ($\rho = 0.30$; $p = 0.010$) than among individuals who viewed the control blog ($\rho = 0.20$; $p = 0.098$). Hypothesis 1c was tested with a similar regression model that substituted centered BFI conscientiousness scores. The interaction effect was not significant for the conscientiousness trait (F -change = 0.10, $\Delta R^2 = 0.001$, $p = 0.753$), which fails to support Hypothesis 1c. Correlations between conscientiousness and NA were not significantly different between the health blog and control blog viewing conditions.

To test Hypotheses 2b and 2c, hierarchical multiple regression analyses similar to the NA models were conducted, except that SE served as the dependent variable. For SE, the interaction effect was nonsignificant for both neuroticism (F -change = 1.25, $\Delta R^2 = 0.007$, $p = 0.265$) and conscientiousness (F -change = 0.10, $\Delta R^2 = 0.001$, $p = 0.753$). Correlations between BFI neuroticism and SE were not significantly different between the health blog and control blog viewing conditions, which fails to support Hypothesis 2b, and correlations between BFI conscientiousness and SE were likewise not significant between the two conditions, which fails to support Hypothesis 1c.

Table 1 Independent *t* tests for the outcome variables

	Control		Experiment		<i>t</i>	Cohen’s <i>d</i>
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>		
Negative affect	13.14	4.24	14.15	4.83	1.35	0.22
Self-esteem	32.71	4.19	31.75	4.87	1.29	0.21

No significant differences

Discussion

The findings suggest that students who viewed the health blog experienced greater NA than those in the control condition, and those who were more neurotic experienced significantly greater NA than those who were less neurotic. In other words, higher neuroticism accentuated the differences in NA between the two blog conditions, supporting Hypothesis 1b. These results are in line with prior research suggesting that individuals with high neuroticism scores exhibit greater emotional instability and negative affectivity on a general basis [33]. The neuroticism trait has also been identified as a strong predictor of the frequency and duration of negative emotions [34].

No main effect of the condition variable was found for all outcome variables: NA and SE. In regard to SE, both Hypotheses 2b and 2c were not supported. Several explanations exist for the lack of findings. First, compared to state affect, state SE may be less flexible to influences from the environment. Merz and Roesch [35] investigated the trait and state variation of positive and negative affect in over 300 college students over 5 days. Statistical analysis suggested approximately equal variability at the trait and state levels. Meanwhile, Donnellan et al. [36] evaluated the longitudinal stability of SE from adolescence to adulthood in a sample of over 450 participants. The study found that the majority of variance in SE measures was accounted for by a stable trait factor, while state factors accounted for about 16%. Previous studies support the relative stability of SE, although this stability may be lower during childhood and adolescence [37, 38]. These findings suggest that SE may be more trait-like and not malleable to provocative situations and stimuli.

The trait assessments collected weeks before participation in the blog experiments were better predictors than the situational variable of viewing condition. Although the blog conditions did not have an immediate effect on an individual's affect or SE, individuals who were more neurotic were more likely to report negative emotions after viewing the health blog.

Several limitations exist in the current study. First, exposure to the health blog for 15 min may not have been sufficient to warrant a measurable impact on an individual's cognitions and emotions. Women are exposed to similar content and images to that depicted in health or fitness blogs on a daily basis, especially during time spent on social networking sites or on the Internet. For instance, a recent trend widely known in the online communities is "fitspiration", an amalgamation of the words "fitness" and "inspiration". It is designed to inspire viewers to achieve an empowered body through exercise and healthy eating [39]. With exposure to such fitspiration messages occurring so regularly in daily life through social media, such as Instagram, 15 min of exposure

to the health blog in this experiment may have been too brief and superficial to instigate a change in the participants' SE.

Second, overexposure to such fitspiration messages may have desensitized participants to the thin images and health content presented in the health blog. For instance, Instagram is one of the most popular social networking platforms that allow users to communicate solely through posting and sharing photos. The website also allows individuals to "tag" their images with different words to make it easier to search for themed content. A search of the word "fitspiration" on Instagram returns a result of 3.3 million images [40]. When a user posts a picture on their Instagram, it also appears in all of their friends' feeds. Additionally, many users link their Instagram and Facebook accounts, allowing any content posted on Instagram to automatically appear in their Facebook. Such mass sharing allows for repeated exposure to fitspiration imagery and content, further desensitizing participants. To address these limitations, researchers may benefit from assessing individual usage of such sources. Assessment may allow exclusion of subjects who may seek out such content on a regular basis and are desensitized.

Third, the study utilized very short screening measures for assessment of self-esteem and negative affect to assess viewing outcomes. Likewise, the predictor variables were measures of normal personality traits, whereas measures of personality disorder may have been more relevant for predicting problems with self-image. Future studies should incorporate more extensive instruments that afford more accurate differential diagnosis and assessment of risk for developing eating disorders. The present study also did not incorporate any measures of positive body image. Examining the role of body image on the impact of viewing health blogs may allow researchers and clinicians to identify potential risk and protective factors. In addition, as the study utilized a cross-sectional design with a student population, the results may not allow for accurate generalization. Future studies should incorporate a longitudinal study to examine long-term effects from health blog exposure and recruit samples representative of the general population. The use of a pretest–posttest design, in which affect and self-esteem are assessed before and after blog viewing, would have been more adequate to explore changes across the experimental and control conditions. Additionally, a well-established eating pathology assessment tool, such as the Eating Disorder Inventory-3 (EDI-3; [41]), could be implemented during the screening and post-exposure assessment to more accurately measure changes in dysfunctional attitudes and thoughts.

Conclusion

Several limitations of the current study design lead us to regard it as a pilot investigation that suggests a number

of promising avenues for future research. The interaction between neuroticism and NA supports prior research findings associating the trait with various negative physical and mental health outcomes [18–20, 23, 42]. The connection between neuroticism and NA may be indicative of the problematic foundation that underlies various dysfunctional behaviors, such as disordered eating. For instance, negative urgency, the tendency to act rashly when distressed, or impulsivity may be more likely in a highly neurotic individual who experiences greater negative emotions than a healthy control. Prior research have found that most viewers of thin-ideal media are unaffected, but those with underlying body dissatisfaction or neuroticism may see decreased mood [43, 44]. Media, whether it be in the form of movies or blogs, may not directly cause body image issues, but may simply exacerbate an individual's pre-existing body dissatisfaction. Further research will allow for more accurate examination of the effect in viewing online health messages.

Compliance with ethical standards

Funding No funding has been received for the current study.

Conflict of interest Both authors, Yaeun Lee and Dr. John E. Kurtz, declare no conflicts of interest.

Ethical approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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