Can online buddies and bandwagon cues enhance user participation in online health communities?

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ABSTRACT

Individuals are more likely to obtain information and support from online health communities than offer help to other users (Fox & Jones, 2009; Preece, Nonnecke, & Andrews, 2004). The current study attempts to resolve this problem of under-contribution by proposing two theory-based persuasive strategies—a specific request in the form of an online buddy and collective community feedback in the form of bandwagon cues. A 2 (online buddy: absence vs. presence) by 2 (bandwagon cues: weak vs. strong) between-participants experiment tested the effects of these strategies on psychological outcomes, including perceived responsibility, social presence, sense of community, and perceived helpfulness, as well as their posting attitudes, posting intentions, and website attitudes, across two sessions. Contrary to expectations, we found that the assignment of online buddies in a health community forum leads to negative psychological and behavioral consequences, especially in the absence of strong community feedback. Furthermore, the online buddy feature interacts with bandwagon cues to activate different cognitive processes, leading to differential interpretation of the meanings of those bandwagon cues—either as compliments (in the presence of online buddy) or as unreliable feedback (in the absence of online buddy). Theoretical and practical implications are discussed.

Keywords:
Online communities; User participation; Online buddy; Bandwagon cues; Social facilitation; Sense of community

Introduction

Online communities are spaces where people with common interests gather together, share information and support each other, without physical contact or geographical limitations (Kollock, 1999; Ridings, Gefen, & Arinze, 2002). A critical requirement for the success of an online community is having sufficient resources for people to create and/or consume. However, these resources are primarily user-generated on a voluntary basis and generally free (Kollock, 1999). Users do not have an obligation to create public goods even though they may have the need to consume it. It is well known that more people read, rather than contribute to, online communities (Fox & Jones, 2009; Preece, Nonnecke, & Andrews, 2004), resulting in an ‘‘undersupply of discretionary information’’ (Connolly & Thorn, 1990, p. 221; see also Fox & Jones, 2009; Mo & Coulson, 2010).

Research has identified two major reasons for this phenomenon, by focusing on the psychological reasons behind why certain users may not contribute: (1) lack of social responsibility for contribution and (2) apprehension about how other users in the online community would react to their postings (Nonnecke, Preece, & Andrews, 2004; Preece et al., 2004). We address both in this study by proposing two design solutions

aimed at persuading users of online health communities to contribute more. One of them is the online buddy system (Du, 2006) imploring users to contribute. The other is community feedback in the form of ‘‘bandwagon cues’’ (Sundar, Oeldorf-Hirsch, & Xu, 2008), targeting the second of the two reasons mentioned above. Even though the presence of online buddies and bandwagon cues essentially serve as invitations for online participation among strangers, there are important differences in the psychological mechanisms activated by these two design features. We explicate these mechanisms in our literature review next.

Literature review

Social loafing behavior and social impact theory

Social impact theory (SIT) argues that the mere existence of others can induce the ‘‘bystander effect’’ such that if someone needs help, an individual is less likely to step forward and offer help when there are others around compared to when they are the only source of potential help (Latané, 1981; Latané & Darley, 1970). For instance, when individuals received personal requests for help from a victim of a theft at a public library but noticed that there were others who could also possibly help, they showed less perceived responsibility and more negligence than when they were alone (Levine & Crowther, 2008; van Bommel, van Prooijen, Elffers, & Van Lange, 2012). However, a direct request for help from a victim has been shown to mitigate this bystander effect (Shaffter, Rogel, & Hendrick, 1975). Thus, unless evident responsibility is assigned to an individual specifically, people in a group feel less responsible for a given task.

Group size also matters in social responsibility dilution. For instance, two experiments replicating Ringelmann’s rope-pulling task examined the relationship between group size and collective effort (Ingham, 1974). As predicted, participants lost their motivation to pull the rope as the group size increased. Latané, Williams, and Harkins (1979) also replicated the study employing shouting and clapping tasks among college students. Even with a simple psychological manipulation of others’ presence (i.e., informing participants to shout or clap together with other people who actually did not exist at any other location), the participants became less devoted to the experiment task as the group size increased. This tendency for ‘‘social loafing’’ has been observed in a number of domains, from cognitive tasks like evaluating a poem as editorial board members (Petty, Harkins, Williams, & Latané, 1977) to real-world situations such as domestic violence (Levine & Crowther, 2008).

SIT suggests that offering help to others requires strong and immediate forces that generate social pressure and one’s perceived responsibility (Karau & Williams, 1995). Therefore, the presence of a large number of online community users is likely to attenuate the immediacy of the social responsibility among users. Given this research, the tendency to lurk online rather than actively contribute is likely to be more pronounced in large, rather than small, online communities.

Negative correlation between community size and user contribution rates online

While large communities can leverage a greater amount of resources than small communities, increases in the number of users in an online community could reduce the tendency among individual users to become a source of information (Karau & Williams, 1995; Latané, 1981). This dilution effect can explain the onset of lurking behaviors online. Yechiam and Barron (2003) found that people accessed surveys more when they were sent via individual emails than when they were sent to a large listserv of 20 discussion groups with 800 subscribers. Email responsiveness was likewise higher when the request was sent to a smaller group than to a larger one (Blair, Thompson, & Wuensch, 2005). People tend to ignore ‘‘help requests’’ sent to larger groups of people of which they are a part. In this context, individuals may feel that their effort would not be very helpful because they feel that other people’s help would count more than theirs (Cialdini, 1993; Latané & Darley, 1970). Similarly, Chidambaram and Tung (2005) found that small groups induced greater member contributions than bigger groups in collaborative decision-making tasks. In fact, Voelpel, Eckhoff, and Förster

(2012) demonstrated a decrease in the quality of the information as group size increased in their examination of the bystander effect in online forums (i.e., Yahoo! Groups).

Online buddy as a solution

As online communities grow in size, the under-contribution problem seems inevitable, particularly due to users' tendency to neglect their social responsibility to share (Karau & Williams, 1995). Therefore, in the interaction process among users, assigning some level of responsibility to users could generate their interest in communicating with other users within a large online community. The ''online buddy system'' may be one way to achieve this. It was initially proposed as a method to alleviate users' lack of attachment to a group (Du, 2006).

Outside the online realm, studies have identified three different types of buddies – mentor (Abdullah, Alzaidiyeen, & Seedee, 2010), helper (Damon, 1984; Thomson, 2010), and supporter (Bauld, Bell, McCullough, Richardson, & Greaves, 2009; Holland, Everitt, Johnson, & Devi, 2008; May & West, 2000) – depending on the interactant's goals and the buddy's qualifications to assist the interactant to achieve those goals. Therefore, the buddy's role centers on the interactant's needs to optimize a counterpart's satisfaction with the specific support that s/he needs (Curtrona, 1990; Curtrona, Russell, & Rose, 1986). In addition, buddies' capability to motivate interactants ranges from a high level of cognitive capability based on prior experiences, including knowledge acquired by education, to emotional availability to embrace another peer in need. However, the buddies may not always need such superior qualities; rather, they must possess compatibility in terms of resource availability. Lastly, the buddy must require at least one other interactant or mate. A single individual cannot be called a buddy without another counterpart. In this sense, the definition of buddy becomes concretized in a special operation called the buddy system. The buddy system refers to an arrangement in which two people help or protect each other (Merriam-Webster Dictionary., 2011) like the common one-on-one relationships in smoking intervention programs (Bauld et al., 2009; May & West, 2000) and other health activities, such as exercising in a gym.

Buddy system in online communities

The buddy system explicated thus far pertains to a reciprocal relationship between two individual users. In order to faithfully operationalize the concept of online buddy, the system needs two actors for an interaction—a provider buddy and a recipient buddy. The current investigation focuses on recruiting a provider buddy to a recipient buddy seeking support in a community rather than assigning an agent to random users. The key idea is to convert lurkers into ''provider buddies''. In doing so, they would be expected to overcome their lurking behavior because the very act of lending support to others will require them to contribute to the community.

Online buddy system and social responsibility

The assignment process in the buddy system can specifically address the core proposition of SIT (Latané, 1981; Shaffter et al., 1975) because an individual (i.e., a recipient buddy) sends a direct request to the provider buddy in the smallest-sized group (i.e., a one-on-one interaction) for the provider buddy to take appropriate action promptly (Yechiam & Barron, 2003). Thus, allocating social responsibility through the online buddy system in a community will persuade users to contribute to the community. On the other hand, absence of a buddy assignment will be associated with a relatively lower level of perceived responsibility.

> H1a. When users are assigned to help another user in an online community, they will perceive greater social responsibility than when they are not assigned to a specific user.
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> H1b. The more social responsibility there is, the greater an individual's intention to help and likelihood of actually performing helping behaviors.

Effects of evaluations: interplay of social impact theory and social facilitation theory

Although the online buddy system will create a natural process for interaction initiation, and thereby modify users' loafing behaviors, it might not be sufficient to encourage lurkers to move forward and repeat such interactions. The second major reason that people become lurkers (aside from lowered perceptions of social responsibility) is that they think their efforts in a group will not be evaluated properly (i.e., evaluation apprehension and lack of immediacy with regard to their contribution activities). Thus, it is still necessary to offer provider buddies visible feedback, or else they may believe that their efforts go unrecognized (Chidambaram & Tung, 2005; Karau & Williams, 1995; Schlorshere, 1989; Yechiam & Barron, 2003).

In fact, the mere presence of others and feedback on individuals' performance reinforces their contributions (Cottrell, Wack, Sekrak, & Rittle, 1968; Harkins, 1987; Latané et al., 1979; Zajonc, 1965; Zajonc & Brickman, 1969). Based on this social facilitation theory (SFT) framework (Zajonc, 1965), Rafaeli and Noy (2002) found that the presence of others significantly enhanced individuals' task performance (in an online auction). The positive effect of feedback is also evident among newcomers—potential lurkers—in Usenet newsgroups (Arguello et al., 2006). van Bommel et al. (2012) also found that people replied to questions more when their user name was salient or their face was recognizable to other users through a webcam than when the user name and face were unidentifiable in an Q&A forum. All these findings suggest that users will perform better (i.e., contribute more content) when they realize that others will read their postings and, better still when they can actually see others' feedback to their postings.

Bandwagon cues as community feedback

Community feedback indicators could trigger a mental shortcut for evaluating information without effortful cognitive processing (Chaiken, 1980, 1987; Petty & Cacioppo, 1986), by activating the bandwagon heuristic—i.e., ''if others think that something is good, then I should, too'' (Sundar, 2008a, p. 83). Community feedback indicators can signal the content's high quality and popularity based on community consensus. As such, provider buddies (i.e., lurkers) are likely to perceive bandwagon support if the community positively evaluates their contributions.

Therefore, bandwagon cues on the interface will likely influence users' perception of other users' evaluations. As SFT predicts, it is likely that lurkers or newcomers will be more willing to contribute in a community when they perceive positive evaluations of their community activity. Based on SIT's central proposition of the immediacy gap in helping behavior, this positive atmosphere created by others' evaluations and presence will be greater when users are specifically requested to help a specific recipient buddy who was assigned by the online buddy system (Karau & Williams, 1995). Thus, the interplay of SIT and SFT will reinforce users' willingness to contribute in online communities.

> H2a. When users comment on questions and their comments attract strong bandwagon ratings, they will perceive more positive evaluations from others' presence than when the comments elicit weak bandwagon cues.
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> H2b. The more positive the perception of others' presence, the greater the intention to participate in the community.
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> H2c. Such effects will be stronger when users are assigned to specific recipient buddies than when they are not assigned to anyone in particular.

Psychological benefits of bandwagon cues in the online buddy system

While the two online-community design features are expected to promote user contribution, they may also benefit the user psychologically.

Sense of agency and sense of community

A sequence of activities performed by one user in an online community (e.g., posting replies and receiving feedback) requires both self-initiated communication as an information source and others' feedback on the information that the user generates (Sundar, 2008b; Sundar & Nass, 2001). When provider buddies (i.e., lurkers) respond to the needs of their recipient buddies, they become the source of information to others. This would make them feel a ''sense of agency'' because they are able exert their own ''influence over the nature and course of the interaction'', (Sundar, 2008b, p. 61). This sense of agency is likely to be higher when the user gets feedback on how well their contributions were received by others in the online community. Stavrositu and Sundar (2012) found that bloggers perceived a significantly higher sense of agency when they received a lot of site visits for their posting. They also found that when they received a lot of comments, they felt a significantly higher sense of community.

In a study with online health communities, strong bandwagon cues (i.e., the number of views, number of replies, number of times the thread was shared, and the star ratings of the thread's helpfulness) led to greater intentions to post on the message board and a stronger sense of community than weak bandwagon cues. In fact, the psychological sense of community significantly mediated the relationship between participants' perceptions of how many times their question thread was shared by others and their attitudes toward posting and their posting intentions (Kim & Sundar, 2011). Based on such research and the preceding theoretical rationale, we propose the following hypotheses for study:

> H3. When users' replies to questions posed by recipient buddies receive strong bandwagon cues, users will show a greater sense of agency (H3a) and sense of community (H3b) than when the replies receive weak bandwagon cues.
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> H4. The higher the sense of agency (H4a) and sense of community (H4b), the greater the level of positive attitudes toward posting.
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> H5. The higher the sense of agency (H5a) and sense of community (H5b), the greater the intention to post.

Psychological states to boost contributors' motivations

Users join an online community to fulfill their relationship motivation such as perceived connectedness with the community network (i.e., ''community interest'') (Wasko & Faraj, 2000), emotional support including friendship and social support (Ridings & Gefen, 2004), and belongingness to the community (Kollock, 1999; Lampe, Wash, Velasquez, & Ozkaya, 2010). In fact, contributors show a greater sense of community than lurkers (Preece et al., 2004). Self-entertainment is another salient motivation to join an online community (Lampe et al., 2010). Users in HIV/AIDS online communities who posted questions and commented on others' questions showed greater levels of enjoyment with the contribution itself, performed more altruistic behaviors, and had stronger feelings of connectedness with the community than members who only consumed others' input (Mo & Coulson, 2010). Sometimes, lurkers are not sure about their ability to contribute to communities (Wasko & Faraj, 2000). Nonnecke and Preece (1999) and Nonnecke et al. (2004) found that people do not want to participate in content contribution because they lack confidence about posting, due to apprehension about others' evaluations. On the other hand, when they post, provide someone with help, and receive positive feedback from the community, they are likely to feel more competent and related to others due to their helpfulness, according to self-determination theory (Sundar, Bellur, & Jia, 2012).

Therefore, lurkers or newcomers will likely perceive psychological benefits of community contribution, such as *enjoying the activity*, *feeling a sense of community*, *developing self-confidence* and experiencing *feelings of helpfulness* through their contributions, which will, in turn, increase their willingness to contribute further to the community. Thus, the following hypotheses are proposed for study:

H6. When users help their recipient buddies and their posting activity receives strong bandwagon cues, they will perceive higher levels of helpfulness to their buddies (H6a), and feel greater perceived competence in (H6b)—and enjoyment (H6c) of—the posting activity, than when their posting activity receives weak bandwagon cues.

Method

Design and participants

All hypotheses were tested with a 2 (online buddy: absence vs. presence) × 2 (bandwagon cues: low vs. high) between-participants controlled lab experiment simulating an online health community, a domain that is known for its under-contribution problem (Fox & Jones, 2009). The community was designed to specifically focus on the topics of diet and nutrition because of their relevance to the sample used in our study (Baxter, Egbert, & Ho, 2008). In all, 100 undergraduate students recruited from several communication classes at a large US university participated in the study. Of the students, 78% were female, and the mean age was 20.62 years old. The majority of participants were white (68%), followed by Asian (12%), Hispanic (9%), black (7%), and others (4%). Participants received extra credit in exchange for their participation in the two study sessions.

Among 100 participants, only three indicated current membership in an online health community. On a 9-point scale ranging from 'never' to 'very often', the participants' (N = 100) perception of their contribution to online health information sharing was relatively low in health message boards (M = 2.19, SD = 1.70) and social networking sites (SNS, M = 3.17, SD = 2.26); however, their perceptions of health information seeking behavior for exercise and nutrition (M = 5.5, SD = 2.12), and diet (M = 5.44, SD = 2.2) were relatively high. Perceptions of general information sharing behavior varied across different platforms, including online message boards (M = 2.92, SD = 2.32), commercial websites (M = 2.35, SD = 1.89) and SNS (M = 4.84, SD = 2.96).

Stimulus website

A website called ''Health Q & A'' was especially created for this study. Designed to imitate the typical functionality of online message boards, this site allowed participants to log in by creating their own account and password. On the account creation page, the participants were asked to provide basic information about their interest in the topic (i.e., diet and nutrition) that would be shared in the community when they registered with the website. This account creation and system login was designed to not only promote the authenticity of the website but also to ostensibly collect information that could be used for assigning them a recipient buddy. This system login also allowed the account owner to view the thread of previous activity without exposure to other participants' postings.

The main page of the website consisted of a list of seven recently updated postings, in addition to default community menus, such as My Page, FAQ, and Research, on the left-hand side of the main site page (see Fig. B.1). The structure of the thread was nested such that users could leave a reply to the original question, and their reply could have replies by other users which were in fact fake accounts maintained by researchers to carefully control the manipulations. For participants to leave a reply to a question, the website directed them to My Page. My Page looked similar to other user account pages in online communities and included a record of the participants' most recent activities, as well as a message box, which is a typical feature of any user account page (see Figs. B.2 and B.3). To avoid any effects due to volume of content, the participants read an equivalent amount of information in the postings across conditions.

Independent variables

The online buddy was operationalized as a recipient buddy— namely, a particular community member that the participant would help by serving as their provider buddy. For the online buddy condition, My Page included partial title links for five questions posted by community members (i.e., Choose your

buddies for today!). Each question in the list of links included author information, such as ''*kzs1420 asked about* Protein without Meat''. Although anonymous, the author information serves to highlight the fact that the website selected one particular member as a recipient buddy from among hundreds of community members. When the participant moused over the link to click it, pop-up instructions appeared in a chat bubble with the message ''*Click the posting to reply! Be a buddy today!*'' (Fig. B.2). When the participant clicked on one of the links, s/he was directed to a thread page, which included the recipient buddy's original question. My Page for participants in the regular board condition (i.e., non-buddy condition) also included a list of five question links under the title ''Questions'' without author information associated with the questions, and it showed ''*Click postings to reply!*'' as bubble pop-up instructions (Fig. B.3).

The second independent variable was operationalized in terms of two types of bandwagon cues—the number of responses to participants' replies and star ratings signifying the level of helpfulness of their replies (as determined by community members). Both bandwagon cues signified popularity of the participant's own posting in the community. Each reply that the participants (i.e., provider buddies) left for their recipient buddies received a predetermined number of replies from other members (i.e., 12 replies vs. 2 replies) and a predetermined helpfulness star rating (i.e., 4 stars vs. 1 star) depending on the experimental condition (Fig. B.4). A native-speaking undergraduate assistant manipulated replies for both the high and low bandwagon conditions. The assistant generated two core replies to the participants' replies on the message board. For the strong bandwagon condition, the additional 10 replies were basically agreement-style responses (containing no new information) in order to avoid introducing any content confounds, including valence of the information (Kim & Sundar, 2011; Sundar, Go, Kim, & Zhang, 2012) (Fig. B.5).

Dependent measures

All the dependent variables were measured using nine-point Likert or Likert-type scales. The complete list of measurement items is available in Appendix C. The current study measured participants' *attitudes toward posting activity* by asking them to evaluate the activity they performed in the online community using an index of four adjectives (i.e., beneficial, wise, enjoyable, and necessary; $\alpha_{\text{session 1}} = .93$; $\alpha_{\text{session 2}} = .93$) (Ajzen & Fishbein, 1980; Furnham & Lovett, 2006; Kim & Sundar, 2011). To predict behavior, this study measured participants' willingness to post on a message board [e.g., ''I intend to post a message (i.e., question or reply) again on this message board''; $\alpha_{\text{session 1}} = .92$; $\alpha_{\text{session 2}} = .90$] (Ajzen & Fishbein, 1980; Fishbein, 2008; Kim & Sundar,2011). *Posting behavior* was directly measured by recording how many times participants provided replies to existing questions in the message board. For *Attitudes toward the website,* participants indicated their degree of favorability of the website using two statements ($r_{\text{session 1}} = .86$; $r_{\text{session 2}} = .72$; $p_s < .0001$) adopted from Lin (2007) and an index of 13 adjectives to describe their feelings toward the website (Kalyanaraman & Sundar, 2006; Kim & Sundar, 2011). An exploratory factor analysis yielded an affective dimension of participants' attitudes toward the website (i.e., useful, positive, good, favorable, and likable; $\alpha_{\text{session 1}} = .94$; $\alpha_{\text{session 2}} = .96$) and an arousal dimension of their attitudes (i.e., exciting, entertaining and stimulating; $\alpha_{\text{session 1}} = .92$; $\alpha_{\text{session 2}} = .92$).

Mediating variables

Perceived responsibility referred to the degree to which the participant felt ''personally accountable and responsible for'' the assignment given to help someone else in the community website (Hackman & Oldham, 1975, p. 162). The current study modified a scale from research conducted in an organizational setting about one's perceived responsibility (12 items; $\alpha_{\text{session 1}}$ .82; $\alpha_{\text{session 2}} = .76$) (Hackman & Oldham, 1974; Pearce & Gregersen, 1991).

Social presence as a result of the positive effects of the bandwagon cues was operationally defined as the

‘‘degree of salience of the other person in a mediated communication and the consequent salience of their interpersonal interactions’’ (Short, Williams, & Christie, 1976, p. 65). The current study applied the concept of social presence (Gefen & Straub, 2003) to the perceived presence of others because of the positive valence of feelings in the online community when bandwagon cues facilitated user contribution (five items; $\alpha_{\text{session 1}} = .91$; $\alpha_{\text{session 2}} = .95$).

Sense of agency was measured by asking participants to rate how they felt about their competence, assertiveness, and confidence with regard to their posting activities on the message board (three items; $\alpha_{\text{session 1}} = .85$; $\alpha_{\text{session 2}} = .91$). *Sense of community*, on the other hand, was measured by asking participants to rate their expectations for interactions with other members in the community (12 items; $\alpha_{\text{session 1}} = .92$; $\alpha_{\text{session 2}} = .91$) (Kim & Sundar, 2011).

Perceived helpfulness referred to the degree to which participants recognized acknowledgment of their activity by other members in the community (van Uden-Kraan, Drossaert, Taal, Seydel, & van de Laar, 2009). van Uden-Kraan et al. (2009) measured constructs that psychologically constituted one’s empowerment while sharing social support in online patient groups. Three items from their measurement specifically captured one’s perception of being helpful so that other group members would assure him/her that s/ he was a good example of a contributor (three items; $\alpha_{\text{session 1}} = .88$; $\alpha_{\text{session 2}} = .92$). *Perceived competence* was measured by participants’ feelings about their ability to complete the task (i.e., posting activity) after their initial interaction with other group members or their visits to the community website (seven items; $\alpha_{\text{session 1}} = .88$; $\alpha_{\text{session 2}} = .91$) (Ryan, Koestner, & Deci, 1991). *Perceived enjoyment* was measured by asking participants if they perceived the activity in the community as a pleasant experience (15 items; $\alpha_{\text{session 1}} = .82$; $\alpha_{\text{session 2}} = .80$) (Deci, Eghrari, Patrick, & Leone, 1994; Ryan, 1982; Ryan et al., 1991).

Procedure

The study consisted of two sessions, one in the lab and the second one online. Upon arrival at the lab, which was equipped with a series of computers in cubicles, participants were given a study ID (i.e., a unique combination of letters and numbers but not their student ID) and then watched video instructions of one of the conditions that described the entire study procedure and demonstrated how to browse the study website, how to find questions on My Page, and how to reply to questions on the site. The participants were informed that the study consisted of two consecutive sessions that would occur within 1 week but that they did not need to take any particular actions on a regular basis. To enhance the online buddy manipulation, participants were asked to read an extra printed copy that explained the website’s online buddy system (Fig. B.6).

After creating their account and logging into the study website, the participants were asked to click the My Page link. When they clicked one of the postings on My Page, they found an original question with either one core reply and one agreement reply to the core reply or no reply at all. Then, the participants were instructed to contribute to the community, as they would normally do in any other social media site. This procedure allowed the researchers to measure actual posting behavior. Once participants posted replies and/or confirmed that they had finished browsing the study website, they continued to complete the main questionnaire for Session 1.

Participants who posted replies in Session 1 received a follow-up email with instructions two days after their initial participation. The email instructions asked participants to check thank-you messages from their online buddies (i.e., recipient buddies whom they helped in Session 1) or a welcome message from the website in the regular board condition (Fig. B.7). Then, they were told to check (1) the number of the comments from community members, and (2) star ratings, which informed them how helpful their comment was to the community’s members, by clicking a link for their last posting on My Page. Two bandwagon cues appeared right next to the title of the posting that they clicked on My Page (Fig. B.4). Lastly, they were told to click the main questionnaire link on My Page to conclude their study participation. The site was tested for usability and

the experimental procedures were extensively pre-tested before launching data collection.

Results

Manipulation effectiveness

Four statements asked participants whether they thought the website had given them a certain number of particular community members for them to provide help to community members in need ($\alpha_{\text{session 1}} = .81$; $\alpha_{\text{session 2}} = .74$). An index that combined both sessions showed a statistically significant difference between the online buddy and non-buddy conditions (one-tailed $t_{(98)} = 1.60$, $p = .05$) in the predicted direction. Participants also answered two different questions asking them to indicate the actual number of replies to their posting and the number of helpfulness rating stars their posting received as well as their perceptions of those numbers in terms of their levels (high or low). Both recall and perception measures for these bandwagon cue manipulations also showed significant differences between the two bandwagon cue conditions in the predicted direction. See Tables A.1–A.3 for details of the analysis.

Online buddy effectiveness on perceived responsibility and user participation intention[1]

H1a anticipated that the online buddy system would induce a greater degree of perceived responsibility among participants than would the non-buddy condition. The results of an ANCOVA revealed no significant differences between the online buddy ($M_{\text{Adjusted}} = 4.70$, $SE = .14$, $n = 49$) and non-buddy conditions ($M_{\text{Adjusted}} = 4.77$, $SE = .14$, $n = 51$) on participants' perceived responsibility ($F_{(1, 92)} = .12$, $p = .73$). Therefore, H1a did not receive statistical support. H1b predicted positive correlations between perceived responsibility and the behavioral intention to post, as well as actual posting behavior (i.e., the number of comments), in the online community website. A strong correlation was found between perceived responsibility and posting intention ($r = .84$, $p < .0001$, $n = 100$) but not between perceived responsibility and the number of comments posted. Therefore, the data demonstrated partial support for H1b.

Testing the effects of online buddy and bandwagon cues on SIT, SFT, and motivation for user contribution

The second set of hypotheses (i.e., H2a, H2b, and H2c) predicted the effects of bandwagon cues on positive psychological feelings with regard to others' presence. In addition, H3a, H3b, H6a, H6b, and H6c predicted that both independent variables would have effects on a variety of motivation-related psychological variables: sense of agency, sense of community, perceived helpfulness, perceived competence, perceived enjoyment, posting attitude, and posting intention. A 2 (online buddy) × 2 (bandwagon cues) MANCOVA found a marginally significant main effect for the online buddy (Wilks' $\Lambda = .09$, $F_{(9, 82)} = 1.74$, $p = .09$).

Specifically, the online buddy condition yielded a marginally significant main effect on social presence ($F_{(1, 90)} = 3.70$, $p = .06$) but in a direction that was counter to hypothesis. The non-buddy condition yielded a greater level of social presence ($M_{\text{Adjusted}} = 5.94$, $SE = .20$, $n = 51$) compared to the online buddy condition ($M_{\text{Adjusted}} = 5.39$, $SE = .20$, $n = 49$). Thus, the study did not receive any statistical support for H2a, H2b, or H2c. Similarly, the online buddy manipulation produced main effects on sense of community ($F_{(1, 90)} = 6.87$, $p < .05$) and intention to post ($F_{(1, 90)} = 3.64$, $p = .06$). The direction of both measured variables was also opposite from the original prediction (social presence: $M_{\text{Adjusted non-buddy}} = 5.08$, $SE = .16$, $n = 51$ and $M_{\text{Adjusted online buddy}} = 4.47$, $SE = .16$, $n = 49$; intention to post: $M_{\text{Adjusted non-buddy}} =$

[1] Covariates included in the analysis are health topic involvement, task involvement, and four individual difference variables – social desirability, social responsibility, altruism, and other-directedness.

4.40, $SE = .22$, $n = 51$; $M_{\text{Adjusted online buddy}} = 3.79$, $SE = .23$, $n = 49$).

Univariate analyses also revealed a marginally significant main effect for bandwagon cues on the intention to post ($F_{(1, 90)} = 3.12$, $p = .08$). The strong bandwagon cue condition produced a greater intention to post ($M_{\text{Adjusted}} = 5.93$, $SE = .17$, $n = 50$) than the weak bandwagon cue condition ($M_{\text{Adjusted}} = 5.50$, $SE = .17$, $n = 50$). Thus, the study found mixed statistical support for H3.

Marginally significant interaction effects between the online buddy and bandwagon cues were also found for perceived helpfulness ($F_{(1, 90)} = 3.53$, $p = .06$) and social presence ($F_{(1, 90)} = 3.55$, $p = .06$) (Fig. B.8). Strong bandwagon cues (compared to weak bandwagon cues) increased the effects when participants had online buddies. However, when participants did not have online buddies, strong bandwagon cues led to lower scores on these measured variables compared to weak bandwagon cues. Thus, this study failed to provide statistical support for H6, which predicted positive effects for online buddy and bandwagon cues on motivational variables. A series of correlation tests showed strong positive correlations between sense of agency, sense of community, social presence, perceived helpfulness, perceived enjoyment, and perceived competence and two dependent variables: posting attitude and intention, which supported H4a, H4b, H5a, and H5b (see Table A.4. for zero-order correlations).

Discussion

Given that lurking behaviors lead to under contribution (Fox & Jones, 2009), especially in large-size online communities (Karau & Williams, 1995; Yechiam & Barron, 2003), we proposed that pairing users with online buddies would encourage user participation. But, the results of our study showed an effect for social responsibility in the opposite direction to what was anticipated by SIT (Karau & Williams, 1995; Latané, 1981).

Conceptual conflict between the online buddy and the online health community

One possible explanation for this finding is that the buddy assignment may have undermined the original definition of an online community and altered the meaning of it in the minds of participants. When participants realized that they had to take care of particular users (i.e., online buddy condition), they exhibited weaker feelings of belonging to the community and lesser intention to post in the future. While the strategy of limiting group size has proven effective for group brainstorming and collaborative work settings (Kraut, 2003; Valacich, Dennis, & Nunamaker, 1992), it does not appear to function the same way in the domain of online health communities. SIT suggests that the aggregated group's performance is important to the group's goal rather than the goals of separate individuals (Moreland, Levine, & Wingert, 1996). The user information in the buddy assignment condition was framed to make salient the exclusive benefits to particular members in need. In doing so, it may have communicated the idea that the participants' posts would benefit only a few as opposed to the entire community. Thus, the online buddy system may only have positive outcomes if it yields both a high level of group bonding and a high level of group identity instead of attachment to particular individuals in the community (Farzan, Dabbish, Kraut, & Postmes, 2011; Ren, Kraut, & Kiesler, 2007).

Thus, it is critical for online communities to supply sufficient levels of community feedback in order to enhance the level of social responsibility when using the online buddy cue. In a similar vein, negative effects of online buddy assignment might be alleviated by employing the principle of reciprocity (Gouldner, 1960; Kollock, 1999; Krishnan & Carment, 1979). People tend to exhibit a greater degree of helping behavior when they have themselves received prior help (e.g., Berkowitz & Daniels, 1964). Therefore, without having any prior benefits in this particular online community, they may have ignored the positive effect of the buddy assignment. On the other hand, when participants received good community feedback

via strong bandwagon cues, the negative effects of the online buddy assignment diminished (Fig. B.8) probably because the feedback served to assure them that their responses to the buddies served the whole community rather than just a few individuals.

Compensation effect of bandwagon cues in the online buddy system

Indeed, the bandwagon cues as community feedback showed a compensatory effect in the interaction with the online buddy. Positive psychological reactions among users who both had buddies and received strong bandwagon cues helped users overcome the conceptual discrepancy caused by the buddy assignment in the community context, which led them to be pleased by good community feedback. However, participants who helped buddies but did not receive good community feedback (i.e., the weak bandwagon cue condition) showed consistently negative psychological reactions (Fig. B.8).

On the other hand, those who were less cued by the online buddy assignment with regard to interaction exclusivity on the community website may have detected the sudden attention from others in the community, grown suspicious, leading them to more carefully scrutinize the community feedback, and found the site less credible when they received a fairly high level of community feedback within a very short time. Such suspicion may not have developed in the weak bandwagon cue condition because users may have believed the amount of time between their posting activity and receiving feedback was too little to elicit strong bandwagon support (Fig. B.8).

Compared to weak bandwagon cues, strong bandwagon cues were seen as validation of participants' helping behavior by the community when the online buddy cue was present. Thus, this endorsement process may have made participants feel flattered, thereby compensating for the negative psychological feelings produced by the conceptual discrepancy experienced in the first session of the experiment. On the other hand, the strong bandwagon cues in the absence of the online buddy cue probably prompted users to engage in a cue-evaluation process to assess the credibility of the cues. This accuracy motivation is well known as a means of reinforcing message elaboration (Eagly & Chaiken , 1993; Forehand, Gastil, & Smith, 2004). In particular, research has shown that the accuracy motivation evokes probing effects such that individuals demonstrate greater suspicion with regard to the ''veracity of information presented'' (Levine & McCornack, 2001, p. 473).

The elaboration likelihood model (Petty & Cacioppo, 1986) can also be used to understand the two cognitive routes for processing bandwagon cues in the two different situations characterized by the presence or absence of online buddies. Participants who perceived bandwagon cues as peripheral cues showed favorable or unfavorable attitudes depending on the valence of the cues (i.e., strong vs. weak). However, when participants in the non-buddy condition centrally processed the bandwagon cues by viewing the cues as arguments, they may have noticed that the ten replies were all very short agreement-style arguments without much information (i.e., weak arguments). That is, while the number of comments serves as a peripheral cue (which can impress the casual user), the content of the comments ended up being weak arguments (leaving the motivated user unimpressed).

Importance of bandwagon cue valence in social facilitation

SFT (Zajonc, 1965) argues that the mere presence of others can amplify the effects of feelings of social responsibility (Rafaeli & Noy, 2002). However, the current study found that users might not solely rely on the recognition of other community members' presence when considering whether to act upon the social responsibility assigned to them. The operationalization of community feedback in the current study contained not only the volume of community feedback (i.e., how many other users paid attention to/recognized a user's posting activity in this community) but also the valence of feedback in the form of the numbers of replies and the star ratings of helpfulness for participants' comments (i.e., how good a user's posting was in the community), which is not the same as a simple cue (e.g., of other members' presence) used in previous

studies (Arguello et al., 2006; Rafaeli & Noy, 2002). In this sense, the main effect of the bandwagon cues on posting intention demonstrated the influence of the community feedback—rather than simply the sheer amount of it—and, in particular, the significance of the feedback's positive or negative valence in terms of popularity of the posting in the community. The bandwagon cues' valence became critical when the cues were presented with or without the online buddy cue. Therefore, theoretical expectations based on SFT need to be precise in explicating what is meant by the presence of others. Our findings suggest that the valence of the cues from others to articulate popularity of user's own posting is more central to social facilitation (resulting from feelings of social responsibility) than the mere existence of cues indicating the presence of others.

Practical implications

The current study offers several recommendations for health website designers in the peer-to-peer communication domain. First, the way the study website presented a short list of questions in the user account page answers one of the fundamental questions regarding individuals' motivations for lurking in online communities. An unsatisfactory level of knowledge about an online community prompts users to avoid active engagement and community participation (Nonnecke et al., 2004). Therefore, this question-filtering system employed in both online buddy and non-buddy conditions of the current study shows users the scope of the community at a micro-level (with the attendant promise of tailoring) rather than overwhelming them with a huge amount of information at the macro level.

However, this question-filtering system in the user account page needs to be implemented carefully when using an online buddy system. The current study suggests the importance of a proper conceptual connection between the function of the online buddy cue and users' understanding of online health communities as a public space for everyone. Therefore, it is critical to create a natural environment by informing users of the importance of their help in terms of benefiting the overall community and providing helpful information and support for other users as well, in addition to helping online buddies. However, the online buddy cue required positive community feedback in order to enhance users' attitudes and intentions to contribute. Therefore, designers must implement a bandwagon cue metric system when they adapt the online buddy idea for encouraging user contribution in online communities.

Conclusion

The current study primarily aimed to make theoretical contributions to research on online sharing of information by proposing, developing and testing two tangible theory-driven solutions for addressing the under-contribution problem in online communities. The exploratory idea of the online buddy system was based on the social psychological literature on the dilution of social responsibility (Latané, 1981). This research discovered limited effects of social responsibility in the context of online sharing with an entire group. The primary theoretical assumption of social responsibility with regard to individuals' willingness to help given a specific help request may not be compatible with the core concept of online communities. Online buddies seem to trigger users' immediate focus on a small number of individual users rather than on the overall community as a whole. They undermine the sense of community especially when the help provided to them does not receive wide, positive recognition from the entire community (operationalized by way of bandwagon cues in this study).

The study revealed a cue compensation effect between online buddy and bandwagon cues. When cues are presented in an accumulated fashion, they lead users to engage in different forms of information processing. The findings showed that strong bandwagon cues gave users psychological relief when they invested a lot of effort in helping buddies. However, weak bandwagon cues tended to discourage them from making more contributions. On the other hand, strong bandwagon cues enhanced users' accuracy motivations when they were not presented with online buddies. Therefore, users viewed the cues as information, and they evaluated

whether that information was credible given this study's particular timeframe (i.e., it only took a few days for bandwagon cues to appear). This probing effect was not prompted in the weak bandwagon cue condition.

Given its theoretical foundations in social psychological research, the current study's findings can be applied to other online sharing domains (other than health) such as educational and organizational communications. The study has demonstrated the potential as well as the limitations of the online buddy system and bandwagon cues in online community interfaces, particularly for newcomers. Findings demonstrate the psychological power of credible positive feedback in encouraging users to contribute. As previous studies indicate (Arguello et al., 2006; Yechiam & Barron, 2003), positivity among newcomers is important for stimulating participation. This is particularly informative to current online educational settings where a one-on-one pair-learning system operates. Although the buddy system has been proven in terms of its effectiveness to motivate people to learn and help people master materials in offline settings (e.g., Abdullah et al., 2010; Thomson, 2010), it might not function in the same way in an online setting where a large group of users share materials and help each other. Instead of the traditional way of pairing two users as exclusive buddies, an in-group-based team assignment might effectively encourage learners to contribute more to the group in the context of an online learning community (Levine & Crowther, 2008). Future research should directly test the effects of a pair of buddies and those of in-group buddies (with more than three users) in an online education community upon users' learning motivation, contribution and outcomes.

The current study is subject to some limitations. The findings and interpretations may need to be qualified using qualitative data that can directly explain how participants felt when they were assigned to an online buddy as compared to those who were asked to interact with others in the non-buddy condition. While the study found lower degrees of social presence and sense of community among participants in the online buddy condition than in the regular community condition, alternative explanations may be possible, such as psychological reactance or differences between the two groups in terms of their experience with the community website. Given the nature of a controlled lab experiment, the participants in the online buddy condition might have felt odd and unsure about interacting with unknown users, given the novelty of the online buddy assignment. Thus, the online buddy assignment might have cued psychological reactance toward the entire process of the study task. Also, the assignment of a goal-oriented and directed task to the participants could have yielded negative feelings toward posting experience and behavior. Thus, qualitative data obtained through in-depth interviews with actual users would help clarify the underlying psychological rationale for findings in this study and thereby enrich their theoretical implications. Despite arguments surrounding the inevitability or triviality of lurking in relation to online community sustainability (e.g., Bishop, 2007; Jones, Ravid, & Rafaeli, 2004; Preece & Shneiderman, 2009; Shiue, Chiu, & Chang, 2010), an online community's vitality depends on the richness and diversity of the information and support that it can provide its users. This ideal of online communities can be fulfilled by having a large number of users who share a wide range of perspectives and experiences via discussions on various topics. The findings from the present study add to our knowledge about promoting user participation and encouraging online sharing of helpful information by suggesting strategic deployment of tools that (a) communicate need for specific health information by certain community members and (b) provide community feedback to users who respond to this need by contributing information. An online buddy system can indeed result in increased participation by community members if it can cater to the entire community rather than just a few individuals seeking help, and provide credible, positive feedback about the contributed information.

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Appendix A. Tables

Table A.1
Recall measure of the number of replies.

Approximately, how many people would you say REPLIED to your posting on the message board?			
Participants' recall	Condition		Total (%)
	12 Replies	2 Replies	
Fewer than 3	8	47	55
More than 3 but fewer than 10	11	3	14
More than 10	31	0	31
Total (%)	50	50	100

$\chi^2_{(2,\ 100)} = 63.22$, $p < .0001$.

Table A.2
Recall measure for the number of helpfulness rating stars.

How many stars did your post receive?			
Participants' recall	Condition		Total (%)
	4 Stars	1 Star	
One star	3	31	34
Two stars	2	17	19
Three stars	6	2	8
Four stars	38	0	38
Five stars	1	0	1
Total	50%	50%	100%

$\chi^2_{(2,\ 100)} = 75.9$, $p < .0001$.

Table A.3
Perception measures of both bandwagon cue manipulations.

	Condition					
	Weak ($n = 50$)		Strong ($n = 50$)			
Perceived replies	Mean	SD	Mean	SD	t-Ratio ($DF = 98$)	p-Value
Too few–too many	3.5	1.63	5.24	1.17	6.13	<.0001
Not at all–very helpful	3.66	1.53	6.88	1.52	10.54	<.0001

Table A.4
Zero-order correlations among measured variables.

	SoA	SoC	SP	PH	PJ	PC	PA	PI
SoA	1	.33**	.51***	.53***	.13	.69***	.63***	.27**
SoC		1	.52***	.60***	.50***	.41***	.59***	.67***
SP			1	.63***	.28**	.46***	.68***	.46***
PH				1	.28**	.61***	.62***	.42***
PJ					1	.26**	.43***	.61***
PC						1	.72***	.34**
PA							1	.52***
PI								1

Note: SoA = sense of agency; SoC = sense of community; SP = social presence; PH = perceived helpfulness; PJ = perceived enjoyment; PC = perceived competence; PA = posting attitude; PI = posting intention.
** $p < .01$.
*** $p < .001$.

Appendix B. Figures

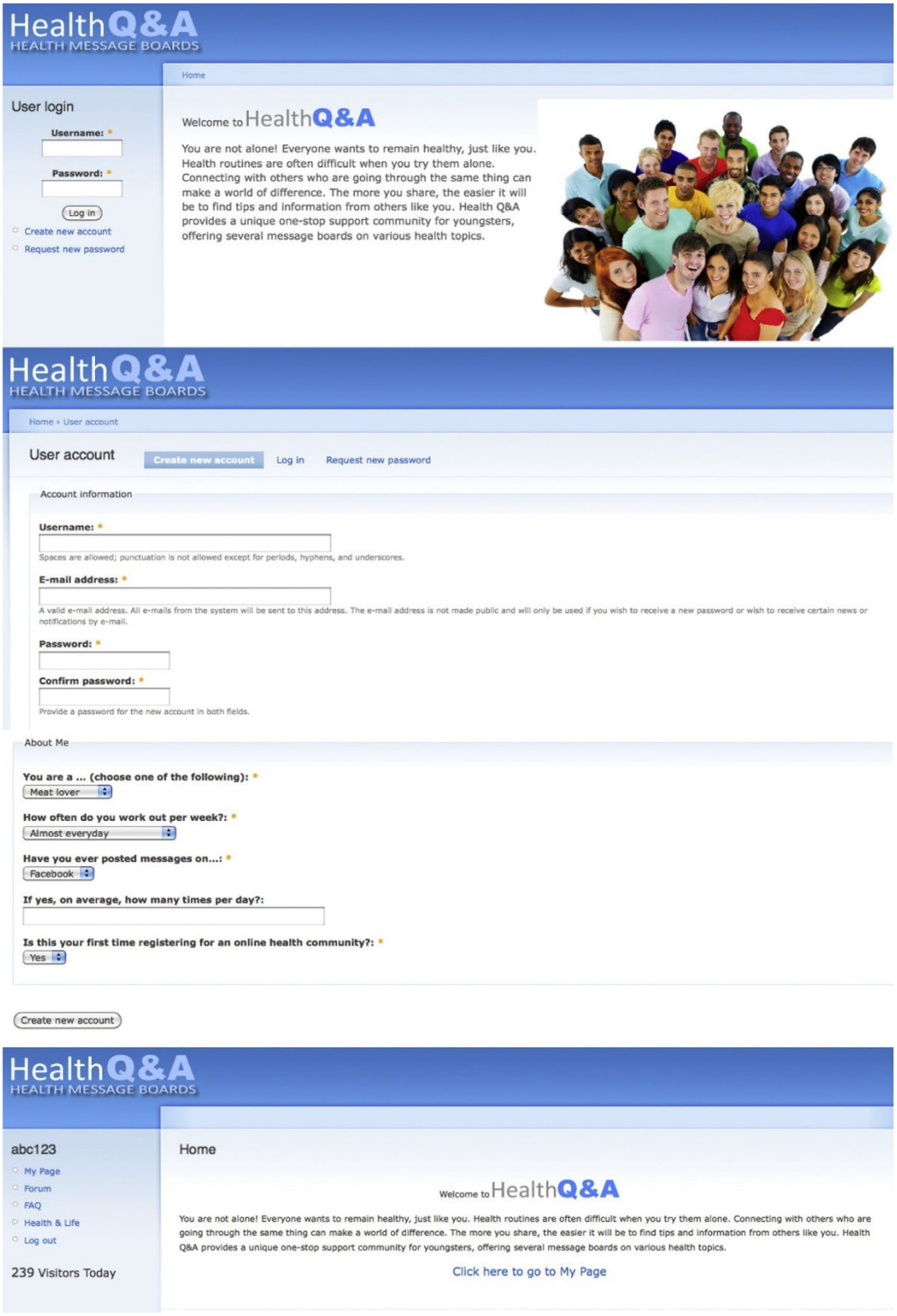


Fig. B.1. Before the user logs in (top), when the user creates an account (middle), and after the user logs in (bottom).

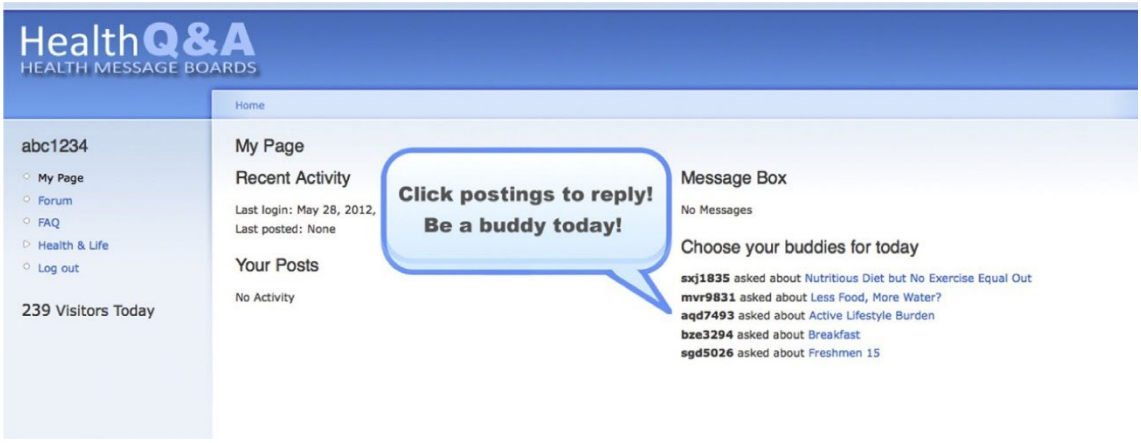


Fig. B.2. Screenshot of My Page for the online buddy condition.

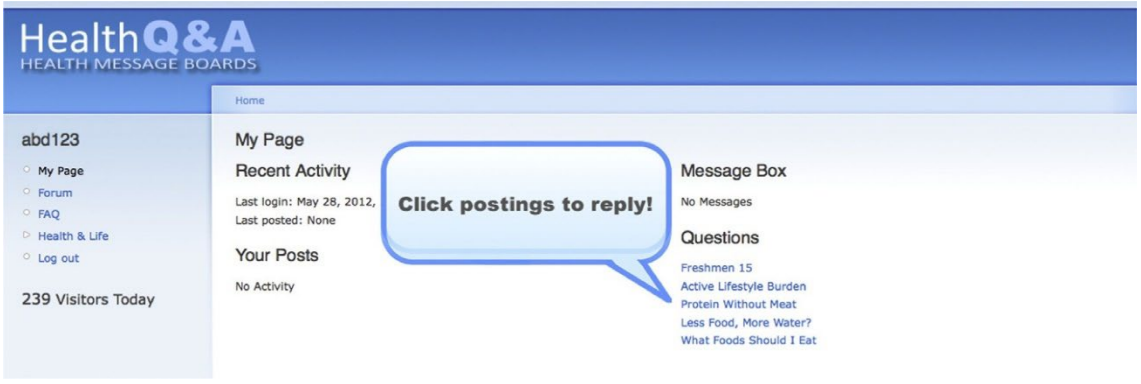


Fig. B.3. Screenshot of My Page for the non-buddy condition.

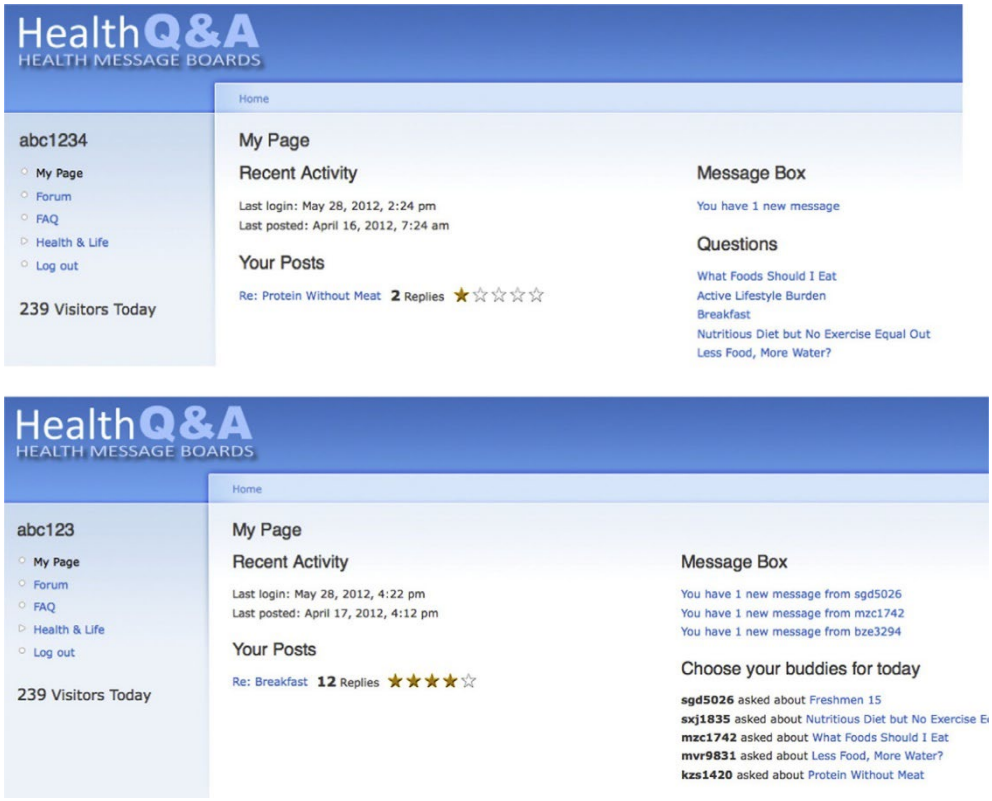


Fig. B.4. Example screenshots of bandwagon cue manipulations in My Page (the top panel shows a combination of weak bandwagon cues and non-buddy whereas the bottom panel shows strong bandwagon and online buddy combination).

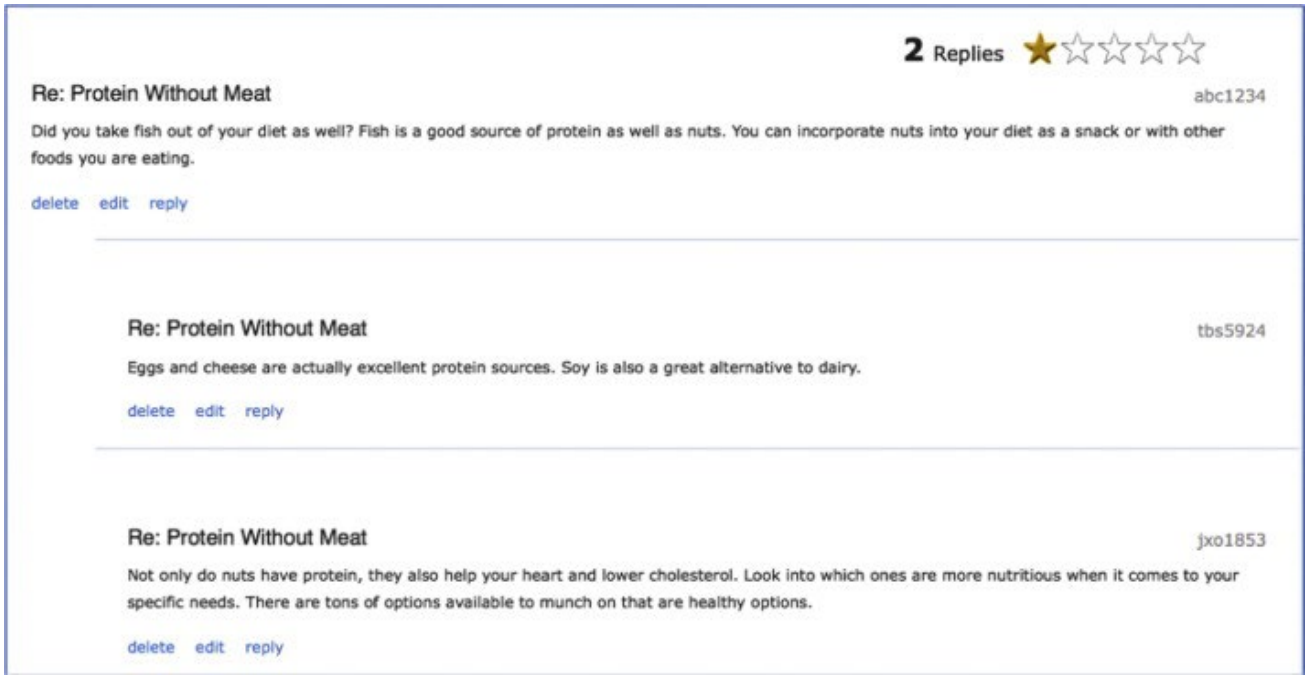


Fig. B.5. Example screenshot of bandwagon cue manipulations (weak) on the thread page.

Please note that this website has **a unique feature that introduces you potential friends with whom you can provide help.** The website will generate a list of your potential online buddies in My Page based on the information about diet and nutrition that you submit when you create a user account of the site. **Remember, your buddies are waiting for your help!**

Fig. B.6. Online buddy manipulation written script.

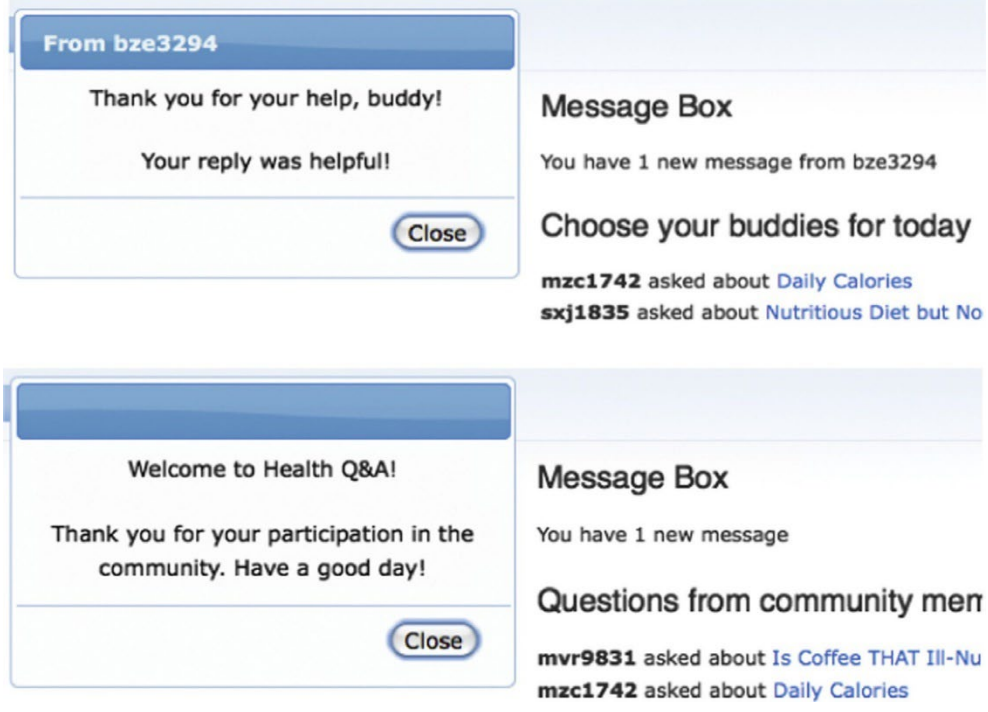
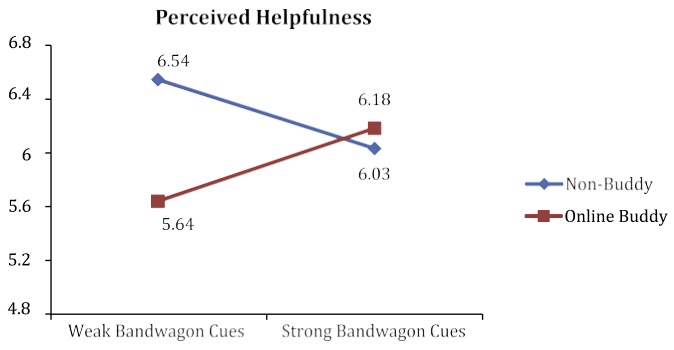


Fig. B.7. Thank-you message on My Page (online buddy condition top and non-buddy condition bottom).



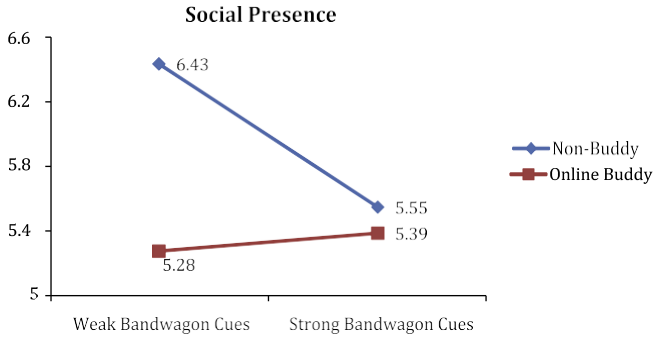


Fig. B. 8. Interaction effects between the online buddy and bandwagon cues (Session 2).

Appendix C. Questionnaire items

Posting Attitudes
(Ajzen & Fishbein, 1980; Furnham & Lovett, 2006; Kim & Sundar, 2011)
My posting on this message board would be…
(Describes Very Poorly = 1; Describes Very Well = 9)
Good, Beneficial, Pleasant, Wise, Enjoyable, Necessary

Posting Intention (Ajzen & Fishbein, 1980; Kim & Sundar, 2011)
Please select a number on the scale that best describes your opinion on each of the following statements. (Extremely Unlikely = 1; Extremely Likely = 9)
I intend to post a message (i.e., question or reply) again on this message board
I will try to post a message (i.e., question, reply, comment) on other message boards
I will plan to post a message (i.e., question, reply, comment) on community websites in general

Website Attitudes
(General website attitude; Lin, 2007)
Please select a number on each scale that best represents how you feel about THE WEBSITE you visited. (Strongly Disagree = 1; Strongly Agree = 9)
The website has personal meaning to me
I like using this website
(Website Attitudes; Kalyanaraman & Sundar, 2006)

Please select a number on each scale that best describes THE WEBSITE you visited
(Describes Very Poorly = 1; Describes Very Well = 9)
Appealing, Useful, Positive, Good, Favorable, Attractive, Exciting, Pleasant, Likable, High quality, Interesting, Entertaining, Stimulating

Perceived Responsibility (Hackman & Oldham, 1974)
Please select the number that best reflects your opinion for each statement below on the scale
(Very Inaccurate = 1; Very Accurate = 9)
The site gave me considerable opportunity for independence and freedom to how I took actions
The site itself was not very significant in the broader scheme of things. (Reversed-coded)
It's hard, on this site, for me to care very much about whether or not the activities get done right (Reversed-coded)
My opinion of myself goes up when I use this site well
Most of the things I have to do on this site seemed trivial. (Reversed-coded)
The work I do on this site is very meaningful to me
I feel a very high degree of personal responsibility for the work I do on this site
I feel bad and unhappy when I discover that I have performed poorly on this site
I feel I should personally take the credit for the results of my work on this site
I feel I should personally take the blame for the results of my work on this site
Generally, my own feelings are not affected much one way or the other by how well I do on this site (Reversed-coded)
Whether or not the work on this site gets done right is clearly my responsibility

Social Presence (Gefen & Straub, 2003)
Please select a number on the scale that best describes your opinion on each of the following statements (Extremely Unlikely = 1; Extremely Likely = 9)
There is a sense of human contact on the site
There is a sense of personalness on the site
There is a sense of sociability on the site
There is a sense of human warmth on the site
There is a sense of human sensitivity on the site

Perceived Helpfulness (van Uden-Kraan et al., 2009)
In this online support group, how likely do you think it would be for...
(Very Unlikely = 1; Very Likely = 9)
Someone to ask for your help or advice?
You to be an example to other participants?
You to offer advice and support to others?

Perceived Competence
Please respond to each of the following items in terms of how true it is for you with respect to your posting on the message board using the scale below.
(Not At All = 1; Exactly = 9)
I feel confident in my ability to post a message on the board I am capable of posting a message on the board
I am able to achieve my goals on this message board
I feel able to meet the challenge of performing well in this message board
I am satisfied with my performance at this posting activity
I was pretty skilled at this activity
This was an activity that I couldn't do very well (Reversed-coded)

Perceived Enjoyment

Thinking of sharing information online (i.e., posting a question, reading replies, etc.) on the website you visited today, please select the number that best describes the reason why you were engaged in the activity of sharing information on this website. Answer each item according to the following scale

(Not at all = 0, Exactly = 8)

Because I thought that this activity was interesting

Because I did it for my own good

Because I was supposed to do it (Reversed-coded)

There might be good reasons to do this activity, but personally I didn't see any (Reversed-coded)

Because I thought that this activity was pleasant

Because I thought that this activity was good for me

Because it was something that I had to do (Reversed-coded)

I did this activity but I was not sure if it was worthy (Reversed-coded)

Because this activity was fun

Because it was a personal decision

I didn't see what this activity would bring me (Reversed-coded)

Because I felt good when doing this activity

Because I believed that this activity was important for me

Because I felt that I had to do it (Reversed-coded)

I did this activity but I am not sure it was a good thing to pursue (Reversed-coded)

Sense of Agency & Sense of Community

You've thought about the activity of commenting on the message board. With this in mind, please imagine what types of outcomes these activities (that is, posting or replying) might have for you. Then, indicate the degree to which each of the following statements describes the outcomes of your posting/replying activity (Kim & Sundar, 2011; Stavrositu & Sundar, 2012)

(Strongly Disagree = 1; Strongly Agree = 9)

(Sense of Agency)

I have control over my own voice

I assert myself

I have a distinct voice

(Sense of Community)

I feel at home in this message board

I care about what readers think of my views and actions

It may well become very important to me to interact with others through this message board

People posting and replying to this message board will not get along with each other (Reversed-coded)

I expect to interact a lot with others through this message board

I expect to receive support from other users on the message board

I expect that some of the users of this message board will be friends with each other

I expect to have friends among those who are users of this community website

I expect that some users in this community website can be counted on to help others

I might feel obligated to help others through this message board

I think I will like users on this message board

I feel other users on this message board will mean a lot to me

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