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How online peer-to-peer conversation shapes the effects of a message about healthy sleep

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Abstract

Conversation about health messages and campaigns is common, and message-related conversations are increasingly recognized as a consequential factor in shaping message effects. The evidence base is limited, however, about the conditions under which conversation may help or hinder health communication efforts. In this study, college students ($N = 301$) first watched a short sleep video and were randomly assigned to either talk with a partner in an online chat conversation or proceed directly to a short survey. Unknown to participants, the chat partner was a confederate coached to say positive things about sleep and the message ('positive' chat condition), negative things ('negative' chat condition), or unrelated things ('natural' chat condition). All respondents completed a short survey on beliefs about sleep, reactions to the message, and intentions to get adequate sleep. Respondents had greater intentions to engage in healthy sleep when they engaged in positive conversation following message exposure than when they engaged in negative conversation after the message ($p < .001$). Positive emotion experienced in response to the message and positive chat perceptions were significant predictors ($p < .05$) of intentions to achieve healthy sleep. Health message designers may benefit from understanding how messages are exchanged in peer-to-peer conversation to better predict and explain their effects.

Keywords

Health communication; health campaigns; message effects; preventive science; conversation; sleep health

Health campaigns and messages are common tools in public health and prevention science. One cannot assume, however, that exposing individuals to a campaign message will elicit a

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Compliance with Ethical Standards

Research involving Human Participants

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.

Conflicts of Interest

The authors declare they have no conflicts of interest.

Informed Consent

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

desired effect on audiences. Conversation generated by health messages and campaigns is gaining attention as an important factor in shaping how campaigns influence attitudes, intentions, and behaviors (Southwell & Yzer, 2007). Some messages are designed to promote conversation (Cho & Salmon, 2007), and evidence suggests conversation (intended or not) is consequential for health message outcomes (David, Cappella, & Fishbein, 2006; Hendriks, van den Putte, de Bruijn, & de Vreese, 2014; van den Putte, Yzer, Southwell, de Bruijn, & Willemsen, 2011). Our evidence base, unfortunately, is limited on the conditions under which conversation helps or hinders desired effects. Several studies show conversation can be beneficial for health messages, perhaps even a necessary component for successful health communication (Hendriks, Van den Putte, & de Bruijn, 2013; van den Putte et al., 2011). Other studies find recipients talk negatively about a message in ways detrimental to intended effects (David et al., 2006; Kam & Lee, 2013).

The evidence base is limited by the fact that many studies on the role of conversation in health message exposure have used observational designs (preventing strong causal conclusions) and simple measures of conversation frequency (without considering content of these conversations; Southwell & Yzer, 2009). Recent years have witnessed growing attention to the idea of conversation valence, using measures of campaign-generated talk that distinguish between conversation that is good for the campaign and conversation that is bad (Brennan, Durkin, Wakefield, & Kashima, 2016; Frank et al., 2010). This study attempts to clarify our understanding of the conditions under which conversation is consequential by testing negative and positive conversation after message exposure on intentions. We add considerable clarity to this question by experimentally manipulating conversation after exposure to a video about healthy sleep using a confederate in an online chat setting, permitting us to draw strong causal conclusions about the impact of positive and negative conversations after message exposure. In doing so, we contribute to the growing body of research arguing that social interactions are critical factors to consider in health message design, research, and evaluation (Southwell, 2013).

Conversation and Health Message Effects

Conversation is sometimes the goal of a health campaign. Notable health campaign messages have specifically asked couples to talk about sex (Frank et al., 2012; Young & Marangwanda, 1997) or parents to talk to their children about drugs (Hornik et al., 2003). Researchers have also observed conversation in response to messages not explicitly designed to promote discussion. In many cases, these conversations have been associated with favorable, campaign-targeted outcomes. Dunlop, Wakefield, & Kashima (2008) found that message recipients, within the context of a large-scale anti-smoking campaign, reported talking about the message. The experience of emotions in response to the message predicted conversation but also intentions to quit. Van den Putte and colleagues (2011) measured conversation at multiple time points and found that exposure to anti-smoking messages prompted discussion about the message that in turn predicted intentions to quit (van den Putte et al., 2011). Anderson and Holody (2014) found that participants reported frequently talking about anti-smoking campaign messages. This talk was, in turn, associated with greater perceived message effectiveness and quit intentions. Hendriks, van den Putte, deBruijn, and de Vreese (2014) compared college students asked to talk face-to-face after a

video on binge drinking with students who were not asked to talk about the video. The authors found intentions to avoid binge drinking were highest when recipients were asked to talk. Jeong and colleagues (2015) measured conversation before and after an anti-smoking public service announcement, finding conversation mediated the relationship between exposure and favorable cognitive and behavioral outcomes. Taken together, this evidence suggests that messages can indirectly and favorably impact targeted outcomes via increased (presumably favorable) conversation about the message or topic.

While many studies find positive associations between conversation and favorable outcomes, there is also evidence that this is not always the case. David, Cappella, and Fishbein (2006) observed that participants who watched an anti-marijuana message then chatted online were likely to discuss so-called “dangerous” topics, such as the idea that marijuana is “cool.” This type of conversation was common and was associated with increased intentions to use drugs. Kam and Lee (2013) examined conversational responses to the National Youth Anti-Drug campaign and found that participant-reported talk about the campaign was associated with undesirable outcomes like visiting pro-drug websites and cigarette use (Kam & Lee, 2013). Brennan and colleagues (2016) further complicate our understanding of the role of conversation in message effects. The authors found that the relationship between conversation and intentions to quit smoking was mediated by perceived message effectiveness. However, the perceived valence of those conversations (from favorable to neutral to negative) influenced the direction of this (indirect) relationship, such that favorably-appraised conversations were associated with greater perceived message effectiveness and intentions to quit smoking, but negatively-appraised conversations were associated with reduced perceived message effectiveness and lower quit intentions (Brennan et al., 2016).

All told, we still lack a nuanced understanding of the conditions under which conversation is likely to help a campaign achieve its objectives and the conditions under which it may undermine these goals. One challenge with research on conversations generated by health messages has been the conceptual and methodological vagueness with which conversation has, at times, been measured. Some researchers assess conversations about the campaign topic (e.g., smoking), while others measure talk specifically about the message (e.g., arguments, sources, or style). Furthermore, several recent exceptions notwithstanding (e.g., Brennan et al., 2016; Frank et al., 2012; Hendriks, de Bruijn, & van den Putte, 2012; Hendriks et al., 2014), research on conversations and message effects often relies on simple measures of frequency. The majority of studies use observational designs, limiting the ability to draw strong conclusions about whether conversation is an independent causal factor shaping message-targeted outcomes or an indicator of some larger process of message reception processing (e.g., McGuire, Rice, & Atkin, 2001).

The Current Study

This study addresses these limitations through a randomized experiment in which we use confederates to manipulate the presence/absence and valence of conversation in response to a short video on sleep health. We first conducted formative research (focus groups) to identify themes of conversations that occurred in response to a short video. We then used

these transcripts to develop conversational scripts for the confederate to use to sway chat room conversations in ways that were positive, negative, or largely unrelated to the message and its content. In doing so, this study is among the first to examine conversational valence by manipulating post-exposure talk and testing its consequences for message-targeted outcomes.

We focused the study on healthy sleep behavior. The short video includes an expert trained in sleep medicine who reviews evidence-based consequences of sleep deprivation, and the recommendation of 7 to 8 hours of sleep for optimal health and tips for healthy sleep (Maas, Robbins, Fortgang, & Driscoll, 2011). Poor sleep in college is a pervasive and pressing public health issue. Approximately 70% of college students report consistently getting insufficient sleep, and poor sleep at this age is associated with unfavorable outcomes like impaired decision making, lower grade point average, and poor general health (Hershner & Chervin, 2014).

We measured behavioral intentions as the targeted outcome rather than sleep behavior itself. Intentions are a strong, proximal predictor of behavior, can be measured immediately after message and conversation exposure, and are more likely to be influenced by a single message or conversation than behavior (Ajzen, 1991; Fishbein & Ajzen, 2009). Testing the conditions under which a message and subsequent conversation can influence intention thus providing insight into how message and conversation strategies may ultimately influence behavior itself (Fishbein & Yzer, 2003). In the current study we draw on previous studies that have found associations between conversation and message-targeted outcomes (e.g., Dunlop et al., 2008; van den Putte et al., 2011; Anderson & Holody, 2014; Hendriks et al., 2012; 2014; Jeong et al., 2015) to hypothesize that positive talk will be associated with intentions to sleep (Hypotheses 1–3). Similarly, we draw on work showing negative conversation can undermine message effects (e.g., David et al., 2006; Lee & Kam, 2013) to hypothesize an inverse association (Hypothesis 1, 4–5):

Hypothesis 1: Participants in the positive talk condition will have higher intentions to engage in healthy sleep than participants in the negative talk condition.

Hypothesis 2: Participants in the positive talk condition will have higher intentions to engage in healthy sleep than participants in the natural talk condition.

Hypothesis 3: Participants in the positive talk condition will have higher intentions to engage in healthy sleep than participants in the no-talk control condition.

Hypothesis 4: Participants negative talk condition will have lower intentions to engage in healthy sleep than participants in the natural talk condition.

Hypothesis 5: Participants negative talk condition will have lower intentions to engage in healthy sleep than participants in the no-talk control condition.

In a series of more exploratory analyses, we also consider the connection between conversation and both objective and message-induced variables that have been the focus of recent work on health messages, conversation, and targeted outcomes. We draw on recent research that has examined the role of perceived message effectiveness (e.g., Brennan et al., 2016; Anderson & Holody, 2014), emotional responses (Brennan et al., 2016; Anderson & Holody, 2014; Dunlop et al., 2008), perceived and objective conversational valence (Brennan et al., 2016; Hendriks, van den Putte, & Bruijn, 2015) and psychological reactance (e.g., Quick & Considine, 2008) in shaping message-targeted intentions and/or behavior. Specifically, we include each of these measures in a single, multivariable model in an effort to understand the independent roles of each in predicting intentions to engage in healthy sleep behavior:

RQ1: How do conversational valence (perceived and actual) and reactions (perceived effectiveness, positive emotion, and psychological reactance) relate to intentions to sleep?

Formative Research

We began with focus groups to understand how college students naturally reacted to a short sleep video in small group settings. We recruited undergraduate students ($n=32$, 18 females, 14 males, aged 18 – 22 years; all) using intercepts outside a college campus library. Focus group discussion followed an open-ended interview protocol that began with general questions about sleep (“How much sleep do you get?”), watching the sleep video, and sharing reactions. The interviewer probed when necessary (e.g., “What do you think about the video?”).

We transcribed the focus groups and the lead author conducted an inductive analysis, which began with a first reading of transcripts and assignment of codes without being overly careful or systematic. During these initial readings, codes were as general as “liking” or “disliking” of the video. In subsequent rounds more nuanced themes emerged (Fielding & Lee, 1998), reflecting greater refinement and specificity such as “liking of speaker tone of voice.”

Table 1 displays results from the analysis of focus group responses and exemplary quotes. Analysis identified two broad conversation topics: 1) sleep-related reactions and 2) message-related reactions. Within the category of sleep-related reactions, themes included 1) importance of sleep and 2) reasons for getting healthy sleep. Within message-related reactions, themes included 1) speaker’s affect and tone and 2) speaker’s credibility. Table 2 outlines comments used in the confederate-induced chat conditions in the randomized experiment.

Randomized Experiment

In the randomized experiment all participants watched the sleep video, chatted online (except the no-chat condition) and completed an online questionnaire. We administered the experiment to a larger sample independent from the formative study. The author’s home

Institutional Review Board (IRB) approved all aspects of the experimental protocol and surveys.

Methods

We recruited participants from college courses offering extra credit for research participation. We used confederates to manipulate the valence of post-message conversation to be either natural (where the confederate did not attempt to sway the conversation in one direction or the other but instead talked only briefly about the video and more generally about life in college), positive talk, or negative talk in three distinct experimental groups.

We administered the study online via a web-based survey software (Qualtrics). When the participant clicked on the survey link they were randomized by the survey software into experimental chat (3/4 probability) or no-chat (1/4 probability) conditions. The experimenter then randomized respondents into conditions within the experimental chat groups, described in more detail below. Participants provided consent before watching the video. Control participants watched the video then proceeded to the questionnaire, whereas experimental participants watched the video then followed instructions for the chat before proceeding to the questionnaire.

Using a random number generator, the experimenter/confederate assigned the participants to natural, negative, or positive conditions and proceeded with the relevant conversational script. We instructed confederates to speak as consistently as possible with the script (see Table 2). For instance, in the negative condition, we instructed participants to talk negatively about sleep, the video, and their self-efficacy to achieve a healthy amount of sleep regularly (e.g., “I feel like sleep - how much we get and all that- is just not really our choice in college”). Once the chat was over, the confederate saved the conversation to a password-protected computer.

The study was made available via an online system for matching courses with extra-credit opportunities. This system allows students who are enrolled in a subset of communication and information science classes (those in which the instructor chooses to use the system) to select specific studies for extra-credit. A total of 354 participants selected the study and agreed to participate. (We have no way of knowing how many students looked for extra credit and/or saw the study so we cannot calculate a study response rate). We randomized the 354 participants who selected the study into one of four experimental conditions: 88 into no-chat, 85 into natural, 85 into negative, and 87 into positive. A total of 83 respondents successfully completed the no-chat condition (94%), 61 completed the natural condition (72%), 67 completed the negative condition (79%), and 81 completed the positive condition (93%). Participation rates were highest in the no-chat control because several chat condition participants did not succeed in taking steps required to engage in the chat and answer the questionnaire. Follow-up discussions with participants who did not complete the study made clear that technical issues led to several respondents skipping the chat portion entirely. In the data-cleaning phase, we identified participants assigned to chat conditions who did not complete the chat and excluded them from the analysis.

Survey Measures

Sleep intention and behavior—We measured behavior and intention using 7-point Likert scales from -3 (strongly disagree) to 3 (strongly agree). We gauged responses to four statements to measure intention, including, “In the next two weeks I intend to sleep 7 – 8 hours most nights of the week,” “In the next two weeks I will sleep 7 – 8 hours most nights of the week,” “In the next two weeks I am willing to sleep 7 – 8 hours most nights of the week,” and “In the next two weeks I plan to sleep 7 – 8 hours most nights of the week.” We averaged these items to form a scale with high inter-item reliability ($M = 1.1$, $SD = 1.5$; Cronbach’s $\alpha = .90$). Two measures assessed sleep, also on 7-point Likert scales of agreement (“In the past two weeks, I slept for 7 to 8 hours most weeknights,” $M = -0.9$, $SD = 2.1$, and “In the past two weeks, I slept for 7 to 8 hours most weekend nights,” $M = 0.9$, $SD = 2.0$).

Perceived conversation valence—Conversation valence perceptions were assessed with several measures, including “How negative or positive was the conversation about getting 7 to 8 hours of sleep at night” and “...the speaker in the video?” on scales from -3 (very negative) to 3 (very positive). We averaged these items to form a single perceived conversation valence scale ($M = .4$, $SD = 1.7$; Cronbach’s $\alpha = .79$).

Conversational realism—As a manipulation check to ensure comparability across conditions, we used a three-item scale to gauge how realistic respondents perceived the conversation (Hendriks et al., 2013). Participants provided agreement (from -3 , strongly disagree, to 3 , strongly agree) with “The conversation I just had online was realistic,” and “How I conversed online in this study was similar to how I normally converse.” Items were averaged into a conversational realism scale ($M = .3$, $SD = 1.3$; Cronbach’s $\alpha = .73$).

Perceived effectiveness—We measured perceived effectiveness of the video message using six items from a validated argument strength scale (Zhao, Strasser, Cappella, Lerman, & Fishbein, 2011). Participants marked agreement from -3 (strongly disagree) to 3 (strongly agree) with statements like, “The video on sleep was convincing,” and “...said something important to me.” We averaged items ($M = .6$, $SD = 0.8$, Cronbach’s $\alpha = .78$).

Positive emotion—We measured positive emotion by asking participants to mark agreement with two statements: “While I was watching the video about on sleep, I felt content” and “...joy” on a scale from (from -3 , strongly disagree, to 3 , strongly agree). We averaged the two items into a positive emotion scale ($M = -.5$, $SD = 1.2$; Cronbach’s $\alpha = .62$).

Psychological reactance—We gauged reactance using a validated scale of negative affective responses to the video (Quick & Considine, 2008). This scale gauged agreement (from -3 , strongly disagree, to 3 , strongly agree) with 4 statements such as “While watching the video on sleep, I felt annoyed” and “...I felt irritated.” We averaged these items into a scale ($M = -1.3$, $SD = 1.3$; Cronbach’s $\alpha = .92$).

Objective Conversation Valence

We also used computerized linguistic analysis (Linguistic Inquiry Word Count, LIWC) software to objectively measure valence. Two researchers independently coded each comment, removed unrelated comments (e.g., “Hey!” or “What’s up?”), separated sleep and message-related comments (coder reliability for this judgment was $\kappa = .96$), then separated confederate and participant comments into two separate files. We analyzed each file using LIWC to distinguish between positive and negative words. We created four objective measures of conversation valence (confederate-positive, confederate-negative, participant-positive, participant-negative).

Analytic Approach

We used SPSS statistical software (v23) for all analyses. We performed an analysis of variance (ANOVA) with post-hoc tests for pairwise differences (unadjusted) to determine if conversation valence was successfully manipulated in each condition. We used ANOVA to gauge differences in perceived and actual valence, as well as intentions to engage in healthy sleep behavior by experimental talk condition (Hypothesis 1 through 5). We used ANOVA to test whether message reactions differed by condition, including message effectiveness. Finally, we conducted ordinary least squares (OLS) regression to explore how different types of conversation (perceived and actual) and message reactions predicted behavioral intention (RQ1). Specifically, we conducted a multivariate regression where all variables from Tables 4 and 5 that varied by condition (based on ANOVA) and predicted intentions in univariate models were regressed on behavioral intention. To arrive at a final, parsimonious model, we removed variables that were not significant ($p > .10$) in step-wise fashion.

Results

Table 3 displays characteristics of the sample ($n=301$). Participants were 74% female and age ranged 17 to 23 years. With the exception of freshmen ($n = 18$; only 6% of the sample), the sample was reasonably distributed in college year across sophomores (35%), juniors (35%), and seniors (23%). More than half of the sample identified themselves as White (58%), with the next most frequent categories Asian (25%), Black (7%), and Hispanic or Latino (5%). Almost half of the sample (47%) agreed with the statement, “I slept for 7 to 8 hours most weeknights over the past two weeks” (selected either “somewhat agree,” “agree,” or “strongly agree”), while 70% agreed with the statement “I slept for 7 to 8 hours most weekend nights.” Sleep behavior did not vary by randomized condition and thus is not considered further in the analysis (weeknight: $F(1,288)=0.01$, $p = 0.910$, weekend: $F(1,285)=0.00$, $p = 0.994$).

Manipulation Check

Table 4 outlines conversation valence (objective and perceived) and conversation realism by randomized condition. Confederates were more negative in the negative condition than both the natural ($M = 4.6$ v $M = 2.8$, pairwise difference $p < .001$) and positive conditions ($M = 4.6$ v $M = 3.6$, $p < .001$). Confederates were more positive in the positive condition than the negative ($M = 8.6$ v $M = 6.1$, $p < .001$), but not significantly more positive than the natural condition ($M = 8.6$ v $M = 8.1$, $p = .45$). The conversation valence manipulation was deemed

successful. Respondents neither agreed nor disagreed the conversation was realistic ($M = 0.3$, near the midpoint of the scale from -3 to 3), and no significant differences were observed by condition.

Participants themselves were more negative in the negative talk condition than participants in the positive talk condition ($M = 4.0$ v $M = 3.3$, pairwise difference $p < .001$) and those in the natural condition ($M = 4.0$ v $M = 0.9$, $p < .001$). Participants were also more positive in the positive condition than participants in the negative condition ($M = 8.5$ v $M = 3.6$, $p < .001$) but not significantly more positive than the natural condition ($M = 8.6$ v. $M = 5.0$, $p = .54$).

On average, respondents perceived natural conversations to be positive (overall $M = .9$ on a scale from -3 to 3 , $SD = 1.0$), including both their perceptions of sleep-related ($M = 1.4$, $SD = 1.5$) and message-related conversation ($M = .3$, $SD = .3$). Participants in the positive talk condition perceived the conversation to be positive ($M = 1.3$, $SD = 1.4$) as well as the video-related ($M = .3$, $SD = 1.3$) and sleep-related discussion ($M = 2.2$, $SD = 2.2$). Participants in the negative condition perceived the conversation to be negative ($M = -1.1$, $SD = 1.6$), as well as the video-related ($M = -1.5$, $SD = 1.5$) and sleep-related discussion to be negative ($M = -.6$, $SD = 2.1$; all one-sample t -tests significant at $p > .001$). Valence differed by condition across all perceived conversation valence measures (all ANOVAs significant at $p < .001$). Respondents in the negative condition perceived the conversation to be more negative than those in the natural ($M = -1.1$ v. $M = 0.9$, pairwise difference $p < .001$) and positive conditions ($M = -1.1$ v. $M = 1.3$, $p < .001$). Participants in the positive condition perceived the overall conversation to be more positive than those in the natural conditions ($M = 1.3$ v $M = 0.9$, $p = .01$).

Experimental Condition Effects on Behavioral Intentions (Hypotheses 1 through 5)

Table 5 shows the primary outcome variable, behavioral intention to sleep, by randomized condition. Behavioral intention to sleep was positive overall ($M = 1.1$, range -3 to 3) but differed significantly by condition $F(1,151) = 4.6$, $p = .020$. Post hoc tests revealed intentions were higher in positive than negative chat conditions ($M = 1.4$ v. $M = .8$, $p < .001$, supporting Hypothesis 1) but not more positive than the natural ($M = 1.4$ v. $M = 1.3$, $p = .805$, rejecting Hypothesis 2) or no-chat control conditions ($M = 1.4$ v. $M = 1.0$, $p = .190$, rejecting Hypothesis 3). Intentions were marginally lower in the negative talk condition than natural ($M = .8$ v. $M = 1.3$, $p = .080$, consistent with Hypothesis 4) but no different than no-chat ($M = .8$ v. $M = 1.0$, $p = .372$, rejecting Hypothesis 5).

Perceived Conversational Valence and Message Responses

Table 5 displays participant reactions to the message by randomized condition. We observed significant differences by condition for ratings of all three measures, including perceived message effectiveness (ANOVA $p < .001$), positive emotion (ANOVA $p < .001$), and psychological reactance (ANOVA $p = .013$). Respondents in the negative talk condition perceived the message to be less effective than the natural condition ($M = 0.0$ v. $M = 0.8$; pairwise difference $p < .001$) and the positive condition ($M = 0.0$ v. $M = 0.8$; $p < .001$). Respondents in the negative talk condition reported lower positive emotion than the positive

condition ($M = -1.0$ v. $M = -0.3$; $p < .001$). Finally, participants in the positive condition experienced less psychological reactance than respondents in the negative talk condition ($M = -1.6$ v. $M = -0.9$; $p = .008$).

Predicting Behavioral Intentions by Conversational Valence and Message Responses (RQ1)

Table 6 reveals that perceived message effectiveness, positive emotion, perceived chat valence (for both the message and the behavior itself), and objective positive chat valence were significant ($p < .05$), positive predictors of behavioral intention. Psychological reactance was a significant ($p < .05$), negative predictor of intention to sleep. The parsimonious multivariate regression model revealed that positive emotion and perceived chat valence about sleep behavior remained significant ($p < .05$), positive predictors of intention after controlling for other reactions. The objective measure of participant positive comments was a marginally significant ($p < .10$) predictor of behavioral intention.

General Discussion

Some health communication interventions have been successful at changing knowledge, attitudes, intentions, and behavior, but not all campaigns are effective (Wakefield, Loken, & Hornik, 2010). Health messages are often received in social settings where conversation with others is possible (Helme et al., 2011). Developing a greater understanding of how the volume and content of conversations about health-related messages shapes message impact may help us to better understand why some health messages succeed while others fail.

This paper advances the literature on health message-generated conversation in a randomized experimental design (Southwell & Yzer, 2009). The vast majority of research on conversation generated by health messages has been observational in nature. This study offers a significant contribution to the field in advancing our understanding of the causal ordering between conversation and message-related outcomes. In a two-step design, we used formative research to identify actual conversational reactions among the target audience (positive and negative) and confederates to manipulate conversational responses in response to a video on healthy sleep in online chat settings. We found evidence that conversation valence is indeed consequential: respondents who were randomly assigned to engage in positive conversations post-message exposure had greater healthy sleep intentions than those who were randomly assigned to negative conversations ($p < .001$). Although the evidence for these claims is more speculative, subsequent exploratory analyses suggest these differences may be driven by the fact that random assignment to positive conversations produced greater positive emotions among respondents, greater respondent perceptions that the conversation was positive, and more positive comments by the participant him/herself. Each of these factors were associated with greater intentions to engage in healthy sleep behavior (p s $< .05$ except positive comments by the participant him/herself, which was only marginally significant, $p < .10$).

Study Implications

These results have implications for prevention science and practice. We conducted the study in the context of healthy sleep behavior among college students. Sleep is a pervasive, pressing public health issue. The majority of college students do not get enough sleep, and poor sleep is associated with a host of undesirable and risky outcomes (Maas et al., 2011). The current study advances our theoretical understanding of message effects in this context. Specifically, the evidence presented here supports the need to consider interpersonal effects (e.g., discussion) in models of message evaluations in addition to intrapersonal factors (e.g., message effectiveness). Further, the study supports the need to consider not only the presence or absence of interpersonal communication but the valence of that conversation (positive or negative toward both the behavior and message itself) to fully understand their effect in message evaluation approaches.

Methodologically, we examined natural reactions to the message to understand generally how college students about a sleep promotion message. We then assigned respondents to conditions where partners delivered experimentally manipulated conversation. In so doing, the current paper addresses a prominent critique of research in this area and reliance on self-reported measures of conversation. The use of random assignment and confederate-induced chats allowed us to draw conclusions about the impact of positive and negative conversation valence in the context of a healthy sleep message. We also made use of linguistic analysis software to distinguish between self-reported, perceived conversation valence and objective conversation. Our results suggest both objective valence as well as perceptions may be consequential, a key insight for future efforts to harness and maximize the impact of post-message conversation.

Results of the current study indicate natural conversation was positive in nature, almost as positive as the confederate-induced positive conversation condition. The natural tendency toward positive conversation may reflect a basic human tendency toward politeness and good manners in conversation. Respondents exposed to the positive chat condition had higher intentions to sleep than respondents exposed to the negative chat, but not higher than natural or no-chat groups. These findings support the work published elsewhere that conversation is common, but also often positive following a message (Frank et al., 2010; Hendriks et al., 2013). The generally positive nature of conversation could reflect the fact that college students are receptive to messages about sleep. Future work could assess whether conversation that naturally arises in response to messages about other health topics follows a similar or different pattern. Nevertheless, it is important to acknowledge that the mere presence of conversation in natural condition, even when it was largely (objectively and perceptually) positive, did not produce significant differences in intentions to engage in healthy sleep relative to the no-exposure control group. This suggests that campaigns may need to consider strategies to actively promote positive conversation about a message or its source in order to achieve favorable outcomes.

Exploratory analyses examined relationships between measures of conversational valence (objective and perceived), message reactions (e.g., emotions, reactance) and behavioral intentions. Interestingly, perceived valence of the conversation was a strong predictor of sleep intentions. In contrast, neither perceived nor actual negative conversation was

associated with intentions. This suggests that perceptions of the conversation being positive may matter as much as actual valence. This finding is consistent with recent research by Hendriks and colleagues (2015), who also found evidence that conversation perceptions were a driver in shaping targeted outcomes. Future work should continue to measure conversational valence through both objective and perceptive methods to further replicate and clarify these patterns in other contexts.

In addition to perceived conversation valence, positive emotional response predicted intentions to engage in healthy sleep. This is noteworthy as previous work largely emphasizes the role of negative affect as a message reaction associated with conversation and targeted behavioral intentions after message exposure (Dunlop et al., 2008). Future work should continue to examine conditions where positive emotion and talk perhaps interact to shape intentions.

Limitations

This study offers empirical and methodological contributions but is not without limitations. The use of a college student sample at a single university may not be generalizable to the broader population of young adults. We made use of an online chat for the experiment. While online chat rooms provide the additional benefit of documentation of conversation, enabling the subsequent LIWC analysis, technology also posed a barrier. Due to technical challenges or misunderstanding of study directions, some participants were unable to access the chat rooms, were not able to successfully complete the chat activity, and were therefore dropped. We note that these difficulties occurred prior to random assignment to the positive, negative, or natural chat conditions, minimizing the chance that these issues introduced bias. However, dropout rates did leave us with less statistical power to detect group differences than originally planned.

We assigned participants to talk to a partner after watching the video. This experimental allocation of discussion may actually represent a dose of information whose effects are challenging to extrapolate from the message. In other words, we did not have a condition in which respondents engaged in sleep-related conversation in the absence of exposure to the healthy sleep message. It may be that the results reflect a unique interaction between the message, the broader context (sleep health), and valence. Future research should replicate these findings using multiple messages across a variety of health-related behaviors before making generalizations about conversational valence.

In addition, we took care to draft transcripts for the confederates to use that employed quotes from reactions actual college students provided in the focus groups. Conversations nevertheless took place between a trained confederate (posing as another student) and participant immediately after exposure to a health promotion message in what participants knew was a research study. It should be noted that the lead author served as one of these confederates, which introduces the possibility of inconsistency in application of the protocol between confederates. However, the confederate protocols were very prescriptive, involving cutting-and-pasting text directly from the protocol into the chat, with only minimal revision to ensure that the discussion felt conversational. To ensure that no bias was introduced, however, we compared LIWC scores for both confederate comments and participant

comments by confederate. These analyses show no differences in valence for any measure, providing no evidence that the use of the lead-author vs. the student confederate introduced any bias.

The online chat platform in the current study offers obvious limitations in terms of ecological validity. College students commonly use online chat software and social media platforms like that used in the current study (Emery, Szczypka, Abril, Kim, & Vera, 2014). It should be noted, however, that participants neither agreed nor disagreed that the conversations were realistic. This may stem from the fact that the chat in the current study used a familiar platform (likely increasing perceived realism) but occurred with a stranger (likely reducing perceived realism). Future work might conduct similar research in other contexts (e.g., exercise or nutrition) with different audiences (e.g., older adults) using different chat platforms. In addition, the importance of positive conversation suggests that message designers and health promotion practitioners may benefit from designing messages that promote positive social talk or engaging community leaders to discuss the importance of a health message following exposure.

Conclusions

Positive conversation about health promotion and campaign materials can be consequential for message effects. This research outlines a novel method for testing how different types of conversation that occur after message exposure influence message-targeted outcomes. Exposure to positive conversation after watching the video was associated with greater intentions to get healthy sleep than exposure to negative conversation. Study findings underscore that the valence of conversation in the context of health message exposure is consequential. Health practitioners and advocates may benefit from preliminary, formative studies to understand how messages are discussed before disseminating those messages broadly.

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Table 1

Pilot Study Focus Group Reactions to the Sleep Promotional Video (N = 31)

Component	Supporting Quotation
Sleep-related reactions	
Consequences of sleep deprivation	<ul style="list-style-type: none"> • “Yeah I basically thought about the consequences like poor decisions, depression, drowsiness, so I can see how that correlates with me not having enough hours to sleep” (Female, sophomore) • “So many negative thoughts, when you’re watching it I cant even count how many negative things he’s said and it’s all true and it’s al things we’ve heard before but it’s all in one place now” (Female, sophomore)
Importance of sleep	<ul style="list-style-type: none"> • “That’s the thing so many people can do it just don’t want to personally I love the feeling of having a full night’s sleep but personally I hate sleeping because I prefer to be doing other things and I feel at times it’s like a waste of time even though you need it but year, definitely easy to do if you put your mind on it even if it’s hard and you don’t see any tangible effects immediately” (Male, junior) • “I just know at one point my body did get accustomed to getting less sleep because I was getting five or six hours a day and I just got used to it so I didn’t really feel the symptoms he was describing so maybe I just subconsciously made bad decisions but I don’t’ consciously remember feeling anything because I just kind of got used to it” (Female, sophomore)
Message-related reactions	
Speaker’s affect and tone	<ul style="list-style-type: none"> • “I feel like it was almost judgmental or like he was angry at me” (Male, sophomore) • “The guy in the video was dry, told me information I’ve heard before in a non-exciting way.” (Female, sophomore)
Speaker’s credibility	<ul style="list-style-type: none"> • “I don’t know who that is. So, you don’t know his credibility” (Male, junior) • “I noticed who he was and dr on his coat so I guess I would believe him but I don’t know what type of doctor he is” (Female, junior)

Table 2

Pilot Study Focus Group Positive and Negative Comments (N = 31)

Actual Comments from Focus Group Participants				
	<i>Positive</i>		<i>Negative</i>	
Attitudes toward Sleep	•	“So, the video was kind of preaching to the choir for me. I love sleep!”	•	“Personally, when it comes to sleep, there are other things I would prefer doing”
	•	“It depends on the night but I usually get about 8 hours”	•	“I just can't see the benefit when there are so many other things like hanging out with my friends”
	•	“I do so much better with adequate sleep in school etc”		
Reactions to the Video	•	“I liked how straightforward the video was. Also, what really struck me are what the side effects are of not getting enough sleep, made me happy I make sleep a priority”	•	“I did not really like the video. It was almost a little absurd, like, all these awful things are going to happen to me if I don't get enough sleep”
	•	“I thought the video was pretty straightforward, and I liked how the speaker just delivered straight, easy to follow facts”	•	“How was the guy in the video? He looks like a paid actor (laughs)”
			•	“He was drilling information at you, he spoke too fast”
Self efficacy to follow advice	•	“Even though my sleep habits are already pretty good, the video was a helpful reminder, because this is when the semester starts to pick up.”	•	“I feel like I understand the risks of short term cognitive and long term risks”
	•	“The video was a great reminder to continue to make sleep a priority”		“I feel like sleep - how much we get and all that - is just not really our choice in college with all the other things going on”

Table 3

Randomized Experiment Demographic Characteristics (N = 301)

Variable	N	%	M (SD)
Age	301		19.9 (1.15)
Race			
White	172	57.1	
Asian	75	24.9	
African American	21	7.0	
Latin American	14	4.7	
Other	14	4.7	
Missing	4	1.3	
Year in School			
Freshman	18	6.0	
Sophomore	106	35.2	
Junior	104	34.6	
Senior	70	23.3	
Missing	3	1.0	
Gender			
Male	76	25.2	
Female	223	74.1	
Missing	2	0.7	
Sleep Behavior			
Weeknight sleep ^τ			0.9 (2.0)
Weekend sleep ^τ			−0.9 (2.1)

^τ Level of agreement, range −3 (“strongly disagree”) to 3 (“strongly agree”) with the statement, “In the past two weeks, I slept for 7 to 8 hours most [weeknights / weekend nights]”.

Table 4

Manipulation Check Variables by Randomized Condition (N = 218)

	Natural Condition		Negative Condition		Positive Condition		ANOVA	
	<i>M</i>	95% <i>CI</i>	<i>M</i>	95% <i>CI</i>	<i>M</i>	95% <i>CI</i>	<i>F</i>	<i>p</i>
Chat Valence – Objective								
Confederate Positive	8.1	[7.2, 9.1]	6.1	[5.5, 6.8]	8.6	[7.8, 9.2]	11.3	<.001
Confederate Negative	2.8	[2.3, 3.4]	4.6	[4.1, 5.1]	3.6	[2.9, 3.7]	15.9	<.001
Chat Valence – Objective								
Participant Positive	5.0	[4.3, 6.1]	3.6	[3.1, 4.1]	8.5	[7.7, 9.5]	38.8	<.001
Participant Negative	0.9	[0.6, 1.2]	4.0	[3.4, 4.5]	3.3	[3.0, 4.3]	35.5	<.001
Chat Valence – Perceived								
Message-Related Chat	0.3	[0.1, 0.6]	–1.5	[–1.9, –1.1]	0.3	[0.0, 0.6]	41.1	<.001
Sleep-Related Chat	1.4	[1.0, 1.6]	–0.6	[–1.2, –0.1]	2.2	[1.7, 2.7]	39.8	<.001
Overall Perceived	0.9	[0.6, 1.1]	–1.1	[–1.4, –0.7]	1.3	[1.0, 1.6]	40.2	<.001
Conversational Realism	0.3	[–0.1, 0.6]	0.3	[0.0, 0.6]	0.2	[–0.1, 0.4]	1.5	.228

Note: Bold indicates significance at the <.05 level, or below.

Table 5
Behavioral Intention and Message Reaction Variables by Randomized Condition (N = 301)

	Control Condition		Natural Condition		Negative Condition		Positive Condition		ANOVA	
	<i>M</i>	95% <i>CI</i>	<i>M</i>	95% <i>CI</i>	<i>M</i>	95% <i>CI</i>	<i>M</i>	95% <i>CI</i>	<i>F</i>	<i>p</i>
Behavioral Intention	1.0	[0.7, 1.4]	1.3	[0.9, 1.7]	0.8	[0.4, 1.2]	1.4	[1.0, 1.66]	4.6	<.020
Perceived Effectiveness	0.7	[0.6, 0.9]	0.8	[0.7, 0.9]	0.0	[-0.2, 0.2]	0.8	[0.6, 1.0]	24.6	<.001
Positive Emotion	-0.3	[-0.6, -0.1]	-0.5	[-0.8, -0.2]	-1.0	[-1.3, -0.7]	-0.3	[-0.5, 0.0]	5.5	<.001
Psychological Reactance	-1.5	[-1.7, -1.2]	-1.4	[-1.7, -1.1]	-0.9	[-1.2, -0.6]	-1.6	[-1.8, -1.3]	3.7	.013

Note: Bold indicates significance at the <.05 level, or below.

Table 6

Regression of Conversation Valence (Objective and Perceived) and Message Responses on Intention (N = 218)

	<i>Model(s) 1</i> Univariate Analyses		<i>Model 2</i> Multivariate Analysis	
	<i>B</i>	<i>p</i>	<i>B</i>	<i>p</i>
Perceived Effectiveness	0.252	<0.001		
Psychological Reactance	-0.187	0.001		
Positive Emotion	0.205	<0.001	0.149	0.039
Perceived Chat Valence – Message	0.172	0.012		
Perceived Chat Valence – Sleep	0.303	<0.001	0.219	0.003
Objective Chat Valence – Negative	0.032	0.654		
Objective Chat Valence – Positive	0.199	0.005	0.123	0.081
Objective Chat Valence – Confederate Negative	-0.078	0.273		
Objective Chat Valence – Confederate Positive	0.029	0.686		
<i>Model R²</i>			<i>0.134</i>	

Note. Preliminary versions of Model 2 included all variables from Tables 4 and 5 that were significantly different by randomized condition based on an ANOVA and were significant in the univariate analyses depicted in Model(s) 1. We removed non-significant variables in a stepwise manner until the final model included only variables at $p < .10$. In this table, bold indicates significance at the $p < .10$, or lower.