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Mixed Messages: III. Negative Statements Within Emotional Support Messages Are More Memorable Than Positive Statements and Predict Longitudinal Outcomes

Colter D. Ray 

This study explores the extent to which support recipients recall positive and negative statements within supportive messages and whether recalling positive or negative statements affected perceptions of the supporter and their messages. Three days after receiving supportive messages, recipients recalled a significantly lower proportion of positive statements but approximately the same proportion of negative statements. Support outcomes (i.e., message effectiveness and affective improvement) were affected by the proportion of negative message statements recalled three days after receiving the message but not by the proportion of positive message statements recalled. It appears negative statements may have a lasting effect on support outcomes.

Keywords: Cancer; Emotional Support; Memory; Message Valence; Mixed Messages; Social Support

For many patients and their family members, the news of a cancer diagnosis is a major stressor (Edwards & Clark, 2004). Although the experiences of being a cancer patient versus a caregiver for a family member with cancer are different, a meta-analysis shows that cancer caregivers often experience as much distress as those they are caring for with cancer (Hodges, Humphris, & MacFarlane, 2005).

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Whereas social support can reduce caregivers' stress (Northouse, Williams, Given, & McCorkle, 2012), family members and other caregivers for those with cancer often experience a lack of social support (Blank, Clark, Longman, & Atwood, 1989). Furthermore, social support can vary in quality, and researchers have identified various reasons why some supportive messages are viewed negatively by cancer patients (Dakof & Taylor; Ray & Veluscek, 2017). However, studies focusing on problematic characteristics of supportive messages have focused on cancer patients' experiences and have not explored instances when such messages are received by cancer patients' family members.

One type of problematic support message is *mixed messages* of support, which are emotional support messages simultaneously including both positive and negative statements (Ray et al., 2019). Findings have shown that negative statements within emotional support messages have deleterious effects on cancer patients' emotional state (i.e., affective improvement), their evaluations of the message and the supporter, and their likelihood of seeking support from the person in the future (Ray, Harvey, Floyd, Bonito, & Reblin, 2021). Until now, these studies have focused on instances of cancer patients receiving mixed messages and have not investigated mixed messages of support received by cancer patients' family members.

The potential longitudinal effects of receiving mixed messages of support have not been investigated either. Investigating longitudinal effects of mixed messages of support is important as prior research has shown that the effects of some emotional support messages can last upwards of three weeks (High & Solomon, 2016). Prior research has also illustrated that cancer patients recall both positive and negative emotional support messages in the weeks, months, and sometimes years after receiving them (Dakof & Taylor, 1990; Ray & Veluscek, 2017). Although not yet investigated, it is likely that cancer patients' family members also recall both positive and negative statements of support and that these statements may have longitudinal effects in the days after receiving such messages.

Therefore, the present study seeks to address these gaps in the research literature. Specifically, this study investigates the extent to which cancer patients' family members recall both negative and positive statements within mixed messages. By tracking what statements within messages are recalled longitudinally, this study also provides insight into the longitudinal effects of receiving and recalling both negative and positive statements of support (i.e., mixed messages). To accomplish these goals, the researcher makes specific hypotheses regarding the role of memory and recall of negative and positive statements within mixed messages. The forthcoming section reviews the benefits of emotional support for those affected by cancer and reviews research on the negativity bias, which is used as a framework for offering hypotheses.

Emotional Support and Cancer

Studies within the cancer context as well as other contexts have found that competently communicated emotional support can benefit recipients by improving their

emotional state. Importantly, these benefits can occur both immediately after receiving emotional support messages (e.g., Jones & Guerrero, 2001) and longitudinally in the weeks after receiving the messages (e.g., High & Solomon, 2016). Likewise, cancer patients view some attempts at emotional support negatively for a variety of reasons. These failed or misguided attempts can lead to detrimental outcomes for cancer patients (Dakof & Taylor, 1990). For example, when recalling problematic emotional support messages, cancer patients noted both the immediate negative influence on their emotional state as well as longitudinal harmful effects on their relationships with their supporters (Ray & Veluscek, 2017).

Many characteristics of emotional support messages and the interactions in which they occur affect recipients' perceptions of message quality (Burlinson, 2008). One of those characteristics is whether the statements within an emotional support message are positive or negative, and importantly, some mixed messages contain both (Ray et al., 2019). Ray and colleagues (2019) initial investigation of the effects of mixed messages on support recipients pointed to the powerful effect of negative statements embedded within otherwise positive messages of emotional support. Specifically, cancer patients rated messages that included a brief negative statement significantly worse than messages consisting of only positive statements in terms of message effectiveness.

A second mixed messages study by Ray et al. (2020) further explored the effects of mixed messages on cancer patients. Specifically, that study investigated how various outcomes were affected by the ratio of positive to negative statements in emotional support messages. Findings showed that as the proportion of negative statements in emotional support messages increased, outcomes such as message effectiveness, affective improvement, perceptions of the supporter's competence, and likelihood to seek future support from the supporter decreased.

These findings align with the principle of negativity dominance—an aspect of the negativity bias in which negative events have the power to ruin otherwise positive experiences (see Rozin & Royzman, 2001). Many studies on negativity dominance focus on the context of impression formation, and findings showed that although negative events happened infrequently, these events have an outsized effect on the impressions people formed of others (Kanouse & Hanson, 1972). As Royzman (2000) notes, the blending together of negative and positive stimuli may lead to negative stimuli being viewed even more negatively than if they were experienced separately and not when embedded amongst positive stimuli. Ray et al. (2019, 2020) indeed found that negative statements within supportive messages had a potent, negative effect on impressions of the supporter (i.e., supporter competence) and the supportive message itself (i.e., message effectiveness). In tandem, these mixed messages studies demonstrate that the presence of a negative statement within an emotional support message may have detrimental effects on recipient outcomes, and that these outcomes become worse as the proportion of negativity increases.

These prior studies were limited by their cross-sectional designs. They did not account for how support recipients may recall and reflect on the supportive messages

they received in the days following those supportive interactions. Whereas cancer patients recall both effective and problematic supportive messages (Dakof & Taylor, 1990), it is unclear what participants would remember from mixed messages of support composed of both positive and negative statements, and how the valence of the recalled statements within these messages would predict recipient outcomes. This study seeks to answer these questions, and in doing so, the researcher turns to the negativity bias as a framework.

The Negativity Bias

Research consistently shows that humans are predisposed to give greater attention and processing to negative stimuli than positive stimuli (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001), and several scholars have speculated about why the negativity bias occurs (see Rozin & Royzman, 2001). Many of these theoretical accounts postulate that possessing a negativity bias is evolutionarily adaptive (Cacioppo, Gardner, & Berntson, 1999; Taylor, 1991). Specifically, negative events are more likely to motivate action than positive events. Whereas people can enjoy positive events without a need for additional cognition or action, negative stimuli alert people to problems and threats that require action (Taylor, 1991).

In particular, people may respond adaptively to negative events through self-regulation. Baumeister et al. (2001) note “the adaptiveness of self-regulation partly lies in the organism’s ability to detect when response modifications are necessary and when they are unnecessary” (p. 358). For example, interviews with cancer patients regarding unwanted and unhelpful support messages illustrated that after receiving such messages, cancer patients often perceived the need to modify their emotional state and future behaviors toward the supporter (Ray & Veluscek, 2017). Specifically, cancer patients engaged in self-regulation by addressing their own emotional reactions, changing their perceptions of the supporter’s ability to communicate support, and increasing control over future supportive interactions. In summary, a negativity bias may exist because “individuals who are attuned to preventing and rectifying bad things should flourish and thrive more than individuals oriented primarily toward maximizing good things” (Baumeister et al., 2001: p. 357).

Does the Negativity Bias Apply to Memory?

Of particular relevance to the present study is whether the negativity bias affects memory. Whereas research across several domains suggest a stable negativity bias, the research on the extent to which a negativity bias occurs in memory formation and recall is much less consistent (Baumeister et al., 2001). In fact, some data suggests the opposite—that memory is one of the few domains that may at times succumb to a positivity bias (Taylor, 1991).

Why is memory one of the few spheres in which bad is not consistently stronger than good? One possibility is that people use memory as a self-enhancement process by repressing negative memories and selectively recalling positive memories about one's self (Skowronski, Betz, Thompson, & Shannon, 1991). That is, people engage in minimization by finding ways to neutralize and reduce the salience of negative events over time (Taylor, 1991). Research has shown that cancer patients accomplish this through a variety of tactics, such as reappraisal (Widows, Jacobsen, Booth-Jones, & Fields, 2005), minimizing (Beach, 2019), or denying the existence of negative information (Vos et al., 2007).

Whereas people may experience a positivity bias toward memory for self-related events, evidence points to a negativity bias when recalling others' actions and experiences (Skowronski et al., 1991). These findings align with prior work purporting that negative information about others has a greater influence on evaluations than positive information (e.g., Kanouse & Hanson, 1972). Researchers have noted that this may occur because negative information about others receives greater processing and that people have an unintentional tendency to shift their focus toward negative stimuli (Pratto & John, 1991). Subsequently, greater attention to an event produces a higher likelihood of remembering that event later (Robinson-Riegler & Winton, 1996). Thus, memory may be subject to both a positivity and a negativity bias, dependent on whether the memory is about one's self or someone else.

Finally, it is worth noting that typically the recall of messages becomes less specific over time. That is, when asked to recall something from short-term memory, such as an emotional support message, people typically do so based on the gist of the message as opposed to the verbatim content of the message (Brown-Schmidt & Benjamin, 2018; Reyna & Brainerd, 1995). Therefore, before offering hypotheses specific to the valence of statements within mixed messages, the researcher posits the following hypothesis regarding the number of statements recalled from an emotional support message recalled over time.

H1: Recall of an emotional support message decreases over time.

Next, considering the research on memory suggests a negativity bias when recalling others' actions, that negative information receiving greater processing than positive information, and that negative stimuli dominate holistic evaluations of events composed of both positive and negative phenomena, the researcher offers the following hypothesis regarding the valence of recalled statements within the mixed messages of support.

H2: Message valence moderates the decrease in recall of an emotional support message over time, such that a larger decrease in recall occurs for positive statements than negative statements.

The Negativity Bias in Emotions and Evaluations

Greater attention and processing of negative statements within emotional support message may also predict recipient outcomes in terms of their affective improvement and their evaluations of the message and the supporter. Emotional support research has shown that verbal characteristics of emotional support messages predict message evaluations and perceptions of supporter competence, which in turn predict affective improvement (e.g., High & Solomon, 2016).

Why, then, would negative statements within emotional support messages predict recipient outcomes as opposed to positive statements? For one, humans have a tendency to shift their attention to negative stimuli automatically at an unconscious level. For example, people tend to remember words describing negative personality traits more so than positive personality traits (Pratto & John, 1991). Additionally, viewing negative words has resulted in more eyeblinks and greater response latency, suggesting greater cognitive processing (Ohira, Winton, & Oyama, 1997). That is, focusing on negative aspects of events may result in a more elaborate encoding process that results in greater recall of negative aspects of events (Robinson-Riegler & Winton, 1996). As previously mentioned, one potential explanation for this tendency is that negative stimuli often signal the presence of an issue or threat that motivates a response, whereas positive stimuli do not require such processing or response (Taylor, 1991). Negative stimuli's demand for greater attention and processing compared to positive stimuli may also explain the findings of recent mixed messages studies (e.g., Ray et al., 2019, 2020).

Thus, although ample research has found that support recipients' evaluations of emotional support messages affect their outcomes (e.g., High & Solomon, 2016), researchers have overlooked the possibility that emotional support recipients may not process the entire message equally. Rather, people may give greater attention and subsequent recall to the message statements that are most salient. Furthermore, the few studies that have investigated both positive and negative aspects of interactions with close others in the cancer context have pointed toward negative information having an outsized influence. Therefore, the researcher predicts the following regarding the number of negative statements recalled three days after receiving an emotional support message.

H3: Recall of negative statements three days after receiving an emotional support message predicts the support recipient's a) evaluation of the message's effectiveness, b) affective improvement, and c) perceptions of the supporter's competence.

Although not expected, it is also possible that recalled positive statements, and not negative statements, within emotional support messages will predict longitudinal recipient outcomes. The mobilization-minimization hypothesis (Taylor, 1991) would be one potential explanation for this possibility. The mobilization-minimization hypothesis contends that when presented with negative information, the initial response is to mobilize resources to resolve the threat. Once this has occurred, people then engage in a minimization process in which they downplay the negative

aspects of an event to cope with potential lingering distress brought on by the negative event. Thus, it is possible that people downplay negative statements within otherwise positive emotional support messages, and that a focus on positive aspects of a message predict the recipient's emotional state and evaluations of the messages and supporter. To test this possibility, the researcher poses the following research question regarding the number of positive statements recalled from an emotional support message.

RQ: To what extent, if any, does the recall of positive statements three days after receiving an emotional support message predict the support recipient's a) evaluation of the message's effectiveness, b) affective improvement, and c) perceptions of the supporter's competence?

Method

Recruitment

Recruitment occurred in two waves. First, the researcher recruited participants through e-mails distributed to his university's staff member e-mail list. This was followed by a second recruitment wave that provided students with the opportunity to participate in the study. Participants had to meet four criteria to participate: being 18 years old or older, being fluent in English, knowing a family member diagnosed with cancer, and the family member's initial diagnosis occurring when the participant was at least 13 years old. More detail on the recruitment protocol including the recruitment script are publicly available as supplemental materials on the Open Science Framework (<https://osf.io/fq4kc/>). In total, the laboratory assistants conducted 153 laboratory sessions (80 with university staff members and 73 with students); however, the researcher removed 25 participants (9 staff members and 16 students) from the dataset for failing an attention check either during the laboratory session or during the online follow-up questionnaire.

Participants

The final sample consisted of 128 adults ranging in age from 18 to 77 years old ($M = 30.54$; $Median = 26.50$; $SD = 13.44$). Ninety-nine participants were women and twenty-nine were men. The most commonly reported race was White (48.30%), followed by Hispanic (27.21%), Asian/Pacific Islander (13.61%), Black/African American (6.80%), Native American/Alaskan Native (2.04%), and Other (2.04%). Note that these totals sum to greater than 100% because 21 participants self-identified as two or more races. Participants primarily recalled a time when a parent was diagnosed with cancer ($n = 53$), with other participants recalling cancer diagnoses for grandparents ($n = 40$), aunts/uncles ($n = 19$), siblings ($n = 5$), in-laws ($n = 3$), cousins ($n = 2$), or their spouse ($n = 2$). Four participants did not report how they were related to their diagnosed family member.

Procedures

The researcher's Institutional Review Board approved all procedures. Participation occurred in three phases. First, participants completed an online prescreening questionnaire to verify they met the four previously mentioned eligibility criteria. The researcher also collected demographic data about both the participants and their family members diagnosed with cancer during this prescreening questionnaire. The prescreening questionnaire automatically redirected qualified participants to an online scheduling system where they self-selected a 35-minute appointment time in the Human Communication Laboratory.

The second phase of participation was the laboratory session. Upon arriving at the researcher's laboratory, a laboratory assistant directed the participant to sit at a computer and begin working on an online questionnaire. The laboratory session questionnaire began with a series of items regarding the participant's relationship with their family member diagnosed with cancer. Next, participants thought of a person who would likely provide emotional support and reported this person's biological sex. A prompt in the questionnaire then informed the participant they would be viewing a series of hypothetical text messages, and that they should imagine the person they previously selected was sending the messages. The questionnaire then randomly assigned the participant to receive one of six series of emotional support text messages that systematically varied in the proportion of positive and negative statements and in the number of positive and negative idea units (more details on the creation of the messages are discussed in the Creation of Stimulus Materials section). Each set of messages consisted of four separate text messages displayed to the participant in 20-second intervals.

After the participant viewed all four messages in the set, the questionnaire transitioned to a page with the prompt: "Think back to the messages you received. Please retype word for word any specific parts of the message that you can recall." Following this page, the remainder of the questionnaire consisted of Likert-style and semantic differential items. At the end of the questionnaire, the laboratory assistant entered the room and informed the participant that the session had concluded and that they would receive an online follow-up questionnaire in 72 hours.

The third participation phase was the online follow-up questionnaire, which occurred three days after the laboratory session. Three days was chosen as the time lag as prior research has found that following a delay of three days, people often recall less than 10% of their own statements and the statements made by their conversational partner during their earlier conversation (Ross & Sicoly, 1979). The follow-up questionnaire again asked the participants to write verbatim what they recalled from the support messages they received during the laboratory session. Participants also completed the same series of closed-ended items they completed at the end of the laboratory questionnaire. Participants who completed the laboratory session received a \$20 Amazon eGift card, whereas the participants who completed the laboratory session and follow-up questionnaire received a \$25 Amazon eGift card.

Creation of Stimulus Materials

Participants received one of six sets of emotional support messages presented as a series of four consecutive text messages during the laboratory questionnaire. Each set of text messages totaled 100 words. The text messages differed in terms of negativity and positivity in two ways. First, the messages differed in the ratio of positive or negative statements in each messages set. The three message conditions based on this ratio were a) six positive portions and zero negative portions, b) five positive portions and one negative portion, or c) three positive portions and three negative portions. For each of the three message conditions there were two different sets of text messages that the participant could receive. The wording of the statements varied, but the length and valence of the two message sets for each condition were the same, allowing for potentially analyzing the conditions as a random effect as opposed to a fixed effect. Although the ratio of positive to negative portions in a message set was one way the messages systematically differed, it was not utilized as an independent variable or predictor variable in this study's analyses.

Instead, the researcher worked with a research assistant to determine the number of positive and negative *idea units* in each message set. Idea units are defined as the smallest unit of a recalled message that has "affective or informational value" (Stafford & Daly, 1984). This choice was made because some message conditions had negative or positive portions that consisted of two different thoughts that could potentially be independently recalled by the participant. For example, the sentence, "I love you, and I'll always be here for you" consists of two different thoughts: "I love you" and, "I'll always be here for you." The issue of the number of positive or negative idea units recalled when messages consisted of varying amounts of positive and negative idea units was addressed by looking at the proportion of positive and negative idea units recalled from the received message (more details on the creation of proportions of idea units recalled are discussed in the Recall of Idea units subheading of the forthcoming Measures section).

The researcher developed the messages in the present study based on messages from a prior study that pilot tested message statements for positivity and negativity (Ray et al., 2021). Additionally, researchers developed the message statements pilot tested in the prior study by using transcripts of actual emotional support messages communicated by participants during an earlier data collection (Ray et al., 2020). Participants in the current study were asked to think about the messages they received and to rate the realism of those messages on a Likert-style scale ranging from 1 (strongly disagree) to 7 (strongly agree). In general, participants perceived the messages received as realistic ($M = 4.98$; $SD = 1.47$).

Measures

Unless otherwise noted, the following measures were presented as Likert-style items ranging from 1 (*Strongly Disagree*) to 7 (*Strongly Agree*). Intercorrelations among the

Table 1 Intercorrelations among the Study's Independent and Dependent Variables

Variable	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
1. Proportion Positive Recalled Idea Units T1	–									
2. Proportion Positive Recalled Idea Units T2	.66***	–								
3. Proportion Negative Recalled Idea Units T1	-.19	-.07	–							
4. Proportion Negative Recalled Idea Units T2	-.15	-.12	.64***	–						
5. Message Effectiveness T1	-.20*	-.01	-.18	-.14	–					
6. Message Effectiveness T2	-.21*	-.03	-.13	-.20	.90***	–				
7. Affective Improvement T1	-.08	.08	-.09	.05	.73***	.68***	–			
8. Affective Improvement T2	-.20*	-.03	-.10	-.13	.79***	.83***	.85***	–		
9. Supporter Competence T1	-.22*	-.04	-.15	-.10	.90***	.86***	.73***	.79***	–	
10. Supporter Competence T2	-.26**	-.09	-.09	-.14	.88***	.89***	.75***	.85***	.89***	–

T1 = Time 1 (measured during the laboratory session). T2 = Time 2 (measured in a follow-up questionnaire distributed three days after the laboratory session). * $p < .05$. ** $p < .01$. *** $p < .001$ (two-tailed).

Table 2 Means, Standard Deviations, and Internal Reliabilities

Variable	<i>M</i>	<i>SD</i>	McDonald's ω
Proportion of Total Recalled Idea Units T1	.49	.21	–
Proportion of Total Recalled Idea Units T2	.42	.21	–
Proportion of Positive Recalled Idea Units T1	.53	.31	–
Proportion of Positive Recalled Idea Units T2	.40	.32	–
Proportion of Negative Recalled Idea Units T1	.60	.42	–
Proportion of Negative Recalled Idea Units T2	.64	.38	–
Message Effectiveness T1	4.51	1.38	.96
Message Effectiveness T2	4.28	1.48	.98
Affective Improvement T1	3.23	1.29	.87
Affective Improvement T2	3.43	1.34	.92
Supporter Competence T1	4.17	1.24	.89
Supporter Competence T2	4.06	1.25	.94

T1 = Time 1 (measured during the laboratory session). T2 = Time 2 (measured in a follow-up questionnaire distributed three days after the laboratory session). ω = the internal reliability statistic McDonald's omega.

study's independent and dependent variables appear in Table 1, whereas Table 2 presents means, standard deviations, and internal reliability estimates.

Recall of Idea Units

First, the researcher and a research assistant established unitizing reliability by each coding the number of idea units recalled by the same subset of 77 participants. The researcher then used Guetzkow's *U* (a statistical measure of disagreement between coders) to determine that the two coders had nearly perfect unitizing reliability ($U = .002$). With unitizing reliability established, the researcher and research assistant coded the remaining participants for number of idea units recalled. Next, the researcher and research assistant coded each of the idea units recalled by 59 participants at both Time 1 and Time 2 as either a positive or negative recalled idea unit. This resulted in each participant having a number of positive and negative idea units recalled at Time 1 and Time 2. The researcher then used Krippendorff's alpha to determine coding reliability. Results demonstrated excellent reliability for both positive idea units ($\alpha = .98$) and negative idea units ($\alpha = .98$). This allowed the researcher and research assistant to code individually the remaining participants' positive and negative idea units at both Time 1 and Time 2.

As mentioned earlier, the messages received by participants differed in the number of positive and negative idea units. To address this issue, the researcher took the number of positive idea units recalled by each participant at Time 1 and divided it by the number of positive idea units present in the message received by each participant. This created a proportion of positive idea units recalled by the

participant. This process was repeated with negative idea units to calculate a variable of number of negative idea units recalled. It was also repeated with number of negative and positive idea units combined to create a proportion of total idea units recalled at Time 1. The process for calculating proportion of positive, negative, and total idea units recalled was then repeated for Time 2 recall of positive, negative, and total idea units.

Message Effectiveness

The Multidimensional Evaluation of Enacted Support Scale (MEESS; Goldsmith et al., 2000) consists of 12 semantic differential items divided evenly amongst three-factors that measure perceptions of a support message's problem-solving utility (helpfulness), emotional awareness (sensitivity), and relational assurances (supportiveness). In the present study, the authors have collapsed these three factors and are treating the message effectiveness scale as a single-factor scale. This decision was made based on the high average intercorrelations among the three subscales when used during the laboratory session ($r = .86$) and in the follow-up questionnaire ($r = .92$). Additionally, the scale demonstrated excellent internal reliability when treated as a single factor both during the laboratory session ($\omega = .96$) and the follow-up questionnaire ($\omega = .98$).

Affective Improvement

Five items from Clark et al. (1998) Comforting Responses Scale measured improvements in the participants' emotional state. These five items included "This person made me feel better about myself" and "I feel better after hearing the person's message." Researchers have previously employed the same five items from this scale to measure affective improvement (e.g., Ray et al., 2021).

Supporter Competence

The researcher used eight items from Cupach and Spitzberg's (1981) Ratings of Alter Competence (RAC) scale to measure supporter competence. Previously, Jones (2004) had derived an 11-item supportiveness subscale from the RAC. The researcher used these same items in the present study; however, three items were not included because they require the respondent to have had a conversation with the supporter instead of receiving messages asynchronously (e.g., "she or he was a good listener").

Variables Tested as Potential Covariates

Relational Closeness to Family Member with Cancer. The Inclusion of Other in the Self (IOS) scale (Aron, Aron, & Smollan, 1992) is single item pictorial measure that displays seven pairs of circles that differ in size and amount of overlap. The measure asks participants to consider themselves as one circle and their family member with cancer as the other circle and to select the set of circles that best

represents their relationship with the family member. Greater overlap in these Venn-like diagrams signifies greater relational closeness, with each set of circles assigned a value from 1 (*no overlap of the two circles*) to 7 (*almost complete overlap of the two circles*). The participant completed the item during the prescreening survey to measure relational closeness to their family member with cancer. A one-sample t-test showed that the relational closeness scores in this sample ($M = 4.50$, $SD = 1.14$) were significantly higher than the midpoint of the scale, $t(127) = 5.00$, $p < .001$ (two-tailed).

Time since Family Member's Initial Cancer Diagnosis. Participants also reported how many years had passed since the family member's initial diagnosis ($M = 5.55$ years, $SD = 5.43$). Average age of the participant when their family member was diagnosed was 25.01 years ($SD = 11.14$).

Stressfulness of Family Member's Cancer Diagnosis. The researcher also asked the participants to rate how stressful the experience was of finding out the family member had been diagnosed with cancer (0 = *not stressful at all*; 100 = *extremely stressful*). Although participants' scores ranged from 5 to 100, a one-sample t-test showed that stress scores ($M = 76.84$, $SD = 24.52$) were significantly greater than the scale's midpoint, $t(127) = 12.38$, $p < .001$ (two-tailed).

Sex of the Imagined Supporter. Participants reported the sex of the supporter they imagined during the laboratory questionnaire. The majority ($n = 94$, 73.43%) imagined a female supporter, 32 (25%) imagined a male supporter, and two participants did not report the sex of the supporter.

Results

Preliminary Analyses

First, the researcher conducted a confirmatory factor analysis (CFA) to assess whether the three dependent variables—message effectiveness, supporter competence, and affective improvement—were statistically distinct. The CFA results showed that they were statistically distinct factors, and overall, the model demonstrated excellent fit ($CFI = .97$; $RMSEA = .06$).

Next, the researcher conducted preliminary analyses to explore potential control variables. Specifically, the researcher tested whether relational closeness to the diagnosed family member, time since initial diagnosis, perceived stress of the diagnosis, and participant's current age significantly correlated with the variables included in the hypotheses and research question. The only significant correlation occurred between relational closeness to the diagnosed family member and affective improvement at Time 2, $r(126) = .20$, $p = .027$ (two-tailed).

Additionally, the researcher used Welch's t-tests to determine whether the study's variables differed based on the biological sex of the supporter that the participant imagined providing the message. Participants who imagined a female supporter reported higher ratings of message effectiveness, affective improvement, and supporter competence compared to those who imagined a male supporter. Therefore,

sex of the supporter was initially included in the regressions conducted to test H3 and the research question. However, in these regressions, sex of the supporter was not a significant predictor of any outcome variable and was therefore removed from the regressions for the sake of parsimony.

Hypotheses 1 and 2

H1 predicts that the proportion of idea units recalled from an emotional support message decreases over time; and H2 predicts that message valence moderates this decrease, such that a larger decrease occurs for proportion of positive idea units recalled compared to the decrease in the proportion of negative idea units recalled. The researcher used a within-subjects ANOVA with two factors (valence of idea units recalled and time) to test these hypotheses. The proportion of idea units recalled was the dependent variable. Time occurred at two levels: immediately after receiving the emotional support message and three days after receiving the emotional support message. Valence of idea units recalled occurred at two levels: positive and negative.

The within-subjects ANOVA produced significant univariate main effects for time, $F(1, 84) = 4.74, p = .032$, partial $\eta^2 = .05$, and for valence of idea units recalled, $F(1, 84) = 5.61, p = .02$, partial $\eta^2 = .06$. The interaction effect for time and valence of idea units recalled was also significant, $F(1, 84) = 16.74, p < .001$, partial $\eta^2 = .17$. To test H1, the researcher compared the group means for the significant main effect for time and, as predicted, a higher proportion of idea units was recalled at Time 1 ($M = .49, SD = .21$) compared to Time 2 ($M = .42, SD = .21$). However, the interaction effect between time and valence of idea units recalled was disordinal (i.e., the proportion of positive idea units recalled decreased over time, but the proportion of negative idea units recalled over time increased). Therefore, the results of this main effect are rendered uninterpretable and H1 is not supported.

To test H2, the researcher used paired samples t-tests to probe the significant disordinal interaction effect between valence and time. As mentioned above, results showed a significant decrease in the proportion of positive idea units recalled three days after receiving the message ($M = .40, SD = .32$) compared to the proportion of positive idea units recalled immediately after receiving the message ($M = .54, SD = .31$), $t(122) = 5.92, p < .001$ (one-tailed), Cohen's $d_z = .53$. Results of a second paired samples t-test showed a nonsignificant increase in the proportion of negative idea units recalled three days after receiving the message ($M = .65, SD = .38$) compared to the proportion of negative idea units recalled immediately after receiving the message ($M = .59, SD = .42$), $t(84) = -1.49, p = .07$ (one-tailed), Cohen's $d_z = .16$. H2 was supported.

Hypothesis 3

H3 predicts that three days after receiving an emotional support message the proportion of negative idea units recalled from the message predicts the recipient's a) evaluation of the message's effectiveness, b) affective improvement, and c) perceptions of the supporter's competence. The researcher tested this hypothesis with three hierarchical regressions. For each regression the first block had two control variables: the proportion of negative idea units recalled by the participant immediately after receiving the message (i.e., participants' Time 1 scores for negative idea units recalled), and the participant's score on the dependent variable immediately after receiving the message (e.g., for the regression testing affective improvement three days after receiving the message, participants' Time 1 scores were included as a control variable). The one exception was the regression testing predictors of affective improvement, which also included relational closeness to the person diagnosed with cancer as a control variable in the first block. The second block had one variable: proportion of negative idea units recalled during the follow-up questionnaire.

The regressions predicting message effectiveness and affective improvement were significant. Specifically, the proportion of negative idea units recalled by the participant three days after receiving the support message was negatively related to message effectiveness and affective improvement. The regression predicting perceptions of supporter competence was nonsignificant. Although there was a negative relationship between proportion of negative idea units recalled three days after receiving a message and perceptions of the supporter's competence, this relationship was nonsignificant. Full details of these regressions appear in [Table 3](#). The results partially support H3.

Research Question

The sole research question asked to what extent, if any, does the proportion of positive idea units recalled three days after receiving a support message predict the recipient's a) evaluation of the message's effectiveness, b) affective improvement, and c) perceptions of the supporter's competence. The researcher conducted three hierarchical regressions to explore this possibility.¹ For each regression, the researcher entered the same variables from H3 into blocks 1 and 2, with the exception of proportion of negative idea units at Time 1 and Time 2, which the researcher replaced with proportion of positive idea units at Time 1 and Time 2. All three regressions showed that proportion of positive idea units recalled three days after receiving the message did not significantly predict evaluations of message effectiveness, affective improvement, or perceptions of supporter competence. Full results of these regressions appear in [Table 4](#).

Table 3 Hierarchical Regressions Testing Negative Idea Units Recalled at Time 2 as a Predictor of Outcome Variables at Time 2

Outcome variable	Predictors	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	ΔR^2
Message effectiveness	Step 1				.79	.79***
	Constant	.01	.26			
	Proportion of negative idea units recalled (T1)	.06	.16	.35		
	Message effectiveness (T1)	.92***	.05	.89***		
	Step 2				.80	.01*
	Constant	.16	.26			
	Proportion of negative idea units recalled (T1)	.36	.20	.12		
	Message effectiveness (T1)	.92***	.05	.89***		
Affective improvement	Step 1				.66	.66***
	Constant	1.52***	.42			
	Proportion of negative idea units recalled (T1)	-.22	.19	-.08		
	Relational closeness to the diagnosed person	-.15*	.05	-.19**		
	Affective improvement (T1)	.82***	.07	.76***		
	Step 2				.69	.03**
	Constant	1.64***	.40			
	Proportion of negative idea units recalled (T1)	.22	.24	.08		
Relational closeness to the diagnosed person	-.15*	.05	-.19**			

(Continued)

Table 3 (Continued)

Outcome variable	Predictors	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	ΔR^2
Supporter competence	Affective improvement (T1)	.86***	.07	.79***		
	Proportion of negative idea units recalled (T2)	-.73**	.26	-.23**		
	Step 1				.69	.69***
	Constant	.43	.27			
	Proportion of negative idea units recalled (T1)	.06	.16	.02		
	Supporter competence (T1)	.85***	.06	.84***		
	Step 2				.70	.01
	Constant	.53	.27			
	Proportion of negative idea units recalled (T1)	.30	.21	.11		
	Supporter competence (T1)	.85***	.06	.84***		
	Proportion of negative idea units recalled (T2)	-.40	.23	-.14		

T1 = Time 1 (measured during the laboratory session). T2 = Time 2 (measured in a follow-up questionnaire distributed three days after the laboratory session). * $p < .05$. ** $p < .01$. *** $p < .001$.

Discussion

Those affected by cancer—be it the patients themselves or their family members—often desire and seek out emotional support. The emotional support messages they receive can vary widely in quality. One characteristic of emotional support messages that influences recipients' outcomes is the overall valence of the message (i.e., its positivity or negativity). Positive and negative statements at times co-occur within single emotional support messages, creating a mixed message of emotional support. Researchers have discovered that the presence of a single negative statement within an emotional support message can have detrimental effects on the recipient. The present study extends this research by investigating 1) the extent to which support recipients recall negative and positive statements within emotional support messages over time, and 2) the extent to which recalling negative statements within emotional

Table 4 Hierarchical Regressions Testing Positive Idea Units Recalled at Time 2 as a Predictor of Outcome Variables at Time 2

Outcome variable	Predictors	<i>B</i>	<i>SE B</i>	β	R^2	ΔR^2
Message effectiveness	Step 1				.81	.81***
	Constant	.02	.25			
	Proportion of positive idea units recalled (T1)	-.11	.20	-.02		
	Message effectiveness (T1)	.95***	.05	.89***		
	Step 2				.81	.00
	Constant	.02	.25			
	Proportion of positive idea units recalled (T1)	-.09	.27	-.02		
	Message effectiveness (T1)	.95***	.05	.89***		
Affective improvement	Step 1				.75	.75***
	Constant	1.27***	.30			
	Proportion of positive idea units recalled (T1)	-.58	.20	-.13		
	Relational closeness to the diagnosed person	-.07	.04	-.08		
	Affective improvement (T1)	.87***	.05	.83***		
	Step 2				.75	.00
	Constant	1.27***	.30			

(Continued)

Table 4 (Continued)

Outcome variable	Predictors	<i>B</i>	<i>SE B</i>	β	<i>R</i> ²	ΔR^2
Supporter competence	Proportion of positive idea units recalled (T1)	-.55*	.27	-.13*		
	Relational closeness to the diagnosed person	-.07	.04	-.08		
	Affective improvement (T1)	.87***	.05	.83***		
	Proportion of positive idea units recalled (T2)	-.05	.27	-.01		
	Step 1				.80	.80***
	Constant	.54*	.22			
	Proportion of positive idea units recalled (T1)	-.28	.17	-.07		
	Supporter competence (T1)	.88***	.04	.88***		
	Step 2				.80	.00
	Constant	.54*	.22			
Proportion of positive idea units recalled (T1)	-.25	.23	-.06			
Supporter competence (T1)	.88***	.04	.88***			
Proportion of positive idea units recalled (T2)	-.05	.22	-.01			

T1 = Time 1 (measured during the laboratory session). T2 = Time 2 (measured in a follow-up questionnaire distributed three days after the laboratory session). * $p < .05$. ** $p < .01$. *** $p < .001$

support messages predicts recipient outcomes. Additionally, this study adds to the literature on social support received by family members of cancer patients. In this discussion section, I interpret the study's findings in light of prior research on the negativity bias, consider the implications of the study's findings for social support researchers and the family members of those affected by cancer, and consider the study's strengths, limitations, and future research directions.

The researcher hypothesized that in general the number of idea units recalled would decrease over the three-day time period after receiving the message. Based on the negativity bias, the researcher further hypothesized that this decrease in recall would be greater for positive statements within mixed messages compared to negative statements within these messages. The results partially supported these predictions. The total number of idea units recalled did decrease over the three days, and the proportion of positive idea units also decreased in this time period. However, contrary to the hypothesis, the proportion of negative statements recalled nonsignificantly increased over the three days in between measurements.

One explanation for fewer positive statements being recalled three days later is that people tend to recall the gist of a message as opposed to verbatim statements (Reyna & Brainerd, 1995). Although most adults with unimpaired short-term working memory could likely recall some verbatim statements immediately after receiving a message, when asked to recall the same message three days later, they may instead only recall the gist of the message—especially the positive statements within a message, which are harmless and require minimal processing (Taylor, 1991). As a result, when asked what they recall from the message three days later, it is possible that participants amalgamated the various positive statements received and instead recalled the general positive sentiment of those statements as opposed to remembering each positive statement.

Why, then, would participants not also recall the gist of the negative statements as well? Prior research suggests that as people give greater attention to a stimulus, the likelihood of recalling the stimuli later increases (Robinson-Riegler & Winton, 1996), and the negativity bias has shown people unintentionally shift their attention to negative stimuli (Pratto & John, 1991). Additionally, an aspect of the negativity bias called negativity dominance would also explain these findings (Rozin & Royzman, 2001). When positive and negative events occur together, negative events tend to dominate the positive events, having a stronger influence on the impression formation process (Kanouse & Hanson, 1972). This may also occur because a negative stimulus may be perceived even more negatively when processed concurrently alongside a positive stimuli as opposed to being processed without a positive comparison point (Royzman, 2000). Finally, compared to positive events that can be enjoyed passively, negative events provoke greater thought and action (Taylor, 1991). Therefore, in this study, the negative statements within emotional support messages may have garnered greater attention and motivated greater processing than positive statements within the messages.

The data also supported the hypothesis that the proportion of negative statements recalled three days after receiving the mixed message predicted the recipients' evaluations of message effectiveness and self-reports of affective improvement during the follow-up questionnaire. This aligns with prior research that connects support recipients' evaluations of emotional support messages with recipient outcomes (e.g., High & Solomon, 2016), but extends these findings by demonstrating that negative statements within such messages, if present, are more likely to be recalled in the future and

subsequently continue to affect those recipient outcomes. Of note, the proportion of negative statements recalled three days after receiving the message did not significantly predict evaluations of the supporter's communication competence. This could be due to low statistical power. Another explanation is that evaluations of messages are independent of evaluations of the supporters who communicate them, although prior mixed messages studies would not support this explanation (Ray et al., 2019, 2020).

The sole research question posed the possibility that the recipients' outcomes would be affected by the proportion of positive statements recalled three days after receiving the message. This was proposed based on Taylor's (1991) mobilization-minimization hypothesis, in which people minimize the negative aspects of events once those aspects have been addressed. The results did not support this possibility, suggesting that negative statements within mixed messages are more potent than positive statements in terms of message evaluations and support recipients' affective improvement. Alternatively, it is possible that a three-day span is not long enough for most people to have adequately processed and addressed the thoughts and emotions generated by the negative statements within these mixed messages.

Implications for Social Support Researchers

Perhaps the most important implication of these findings is that support recipients do not recall all statements within supportive messages equally. With a great deal of social support research focusing on message characteristics that predict a variety of outcomes, such as message effectiveness and emotional improvement, these findings suggest that some statements within supportive messages may not be recalled by recipients just three days after receiving support. This appears to be the case, in particular, for positive portions of supportive messages, which were recalled at a lower proportion compared to negative statements three days after receiving a message. Thus, even when support messages are composed mostly of positively valenced statements, the support recipients may instead recall negative, unhelpful, or any otherwise problematic statements from that message for a longer period of time.

The significant decline in the amount of positive statements recalled in a three-day span also explains why some who are affected by cancer desire consistent emotional support from their networks. Although some emotional support messages may become memorable messages (Miller & Ray, 1994) that the recipient can recall and reuse as they continue to cope with cancer, this study's results showed that the proportion of positive statements recalled declines in as little as three days. Moreover, chronic stressors such as being a cancer caregiver may present new challenges on a daily or weekly basis that may warrant the need for additional and consistent emotional support from others. Although some emotional support messages could be recalled and reused to cope with a changing stressor, it is possible that many support messages are forgotten in the initial days after receiving them, thus

necessitating the need for a robust network of supporters who can provide adequate support across long periods.

Implications for Those Communicating and Receiving Support

These findings can help supporters understand why some statements within support messages are more memorable and consequential to recipients than other statements. Based on these findings, supporters who anticipate communicating messages but have not yet done so should weigh the benefits and risks of communicating negative statements. Supporters who have already communicated their supportive messages should assess whether any of their supportive interactions or messages with others may have been construed negatively as unhelpful or unwanted. If they believe this is a possibility, the supporter may want to communicate why they communicated any negative statements (e.g., out of frustration or from a place of concern) as a way of providing context to their messages.

For those affected by cancer who are receiving support, this study's results may explain why they find their attention drifts toward negative aspects of supportive messages and interactions as opposed to focusing on the positive aspects of these messages. A single criticism or instance of blame embedded in an otherwise positive supportive message may be hard to ignore and may have a longer lasting influence on outcomes compared to positive support messages. Likewise, support recipients should make a concerted effort to focus on the positive aspects of the support they receive, even if portions of the supportive messages communicated to them are at times frustrating or unhelpful.

Strengths, Limitations, and Future Directions

As with any research endeavor, the present study had strengths and limitations. These limitations, however, also suggest future areas of inquiry within this line of research. The study's strengths include its experimental design, which allowed the researcher to exercise greater control over extraneous variables while testing the effects of messages that varied in the number of positive and negative idea units. Having noted this, future research should test for recall of support messages that are consistent in the number of total idea units in each message condition. Future research should also account for additional variables that may offer alternative explanations for the study's results. For example, measuring the participants' mood at the time of participation may affect message recall. Research on mood-congruent recall has shown that non-depressed individuals typically recalled positively valenced material, sub-clinically depressed individuals typically recalled negative and positive material equally, and clinically depressed individuals typically recalled negative material (Matt, Vázquez, & Campbell, 1992). Caregivers of those with cancer often experience depression (Geng et al., 2018), which may make them more likely to recall negative statements in supportive messages.

Future studies should also consider researching mixed messages of emotional support in non-laboratory settings when participants are coping with current stressors and receiving real, non-hypothetical supportive messages from loved ones. To date, studies on mixed messages of emotional support have used hypothetical messages (Ray et al., 2019, 2020), creating a threat to the ecological validity of the findings. Even though the message realism scores in the present study were significantly greater than the scale's midpoint, a hypothetical message in a controlled experimental design prevents the researcher from observing the variety of ways mixed messages may occur in naturally occurring interactions. As stated by Burluson and MacGeorge (2002: p. 391), "There is obviously a difference between actually experiencing a message when upset and making judgment about messages directed at hypothetical others." Additionally, mixed messages studies conducted in a non-laboratory setting would also allow for the study of how supporters use nonverbal communication to express negative statements such as disappointment or criticism of a person's coping decisions.

The longitudinal design of this study was also a strength; however, future research ought to track the recall of messages and recipient outcomes over longer periods than three days and with data collections at more than two points in time. Doing so would allow researchers to investigate the "lifespan of a support message"—tracking what is recalled, how it is processed, and the effects it has on the recipient over the course of weeks or even years. Such an endeavor would give greater evidence to previous research on emotional support messages becoming memorable messages (Miller & Ray, 1994). In doing so, future researchers could also explore instances when negative statements within support messages that were initially deemed hurtful may later be perceived as helpful, necessary, and ultimately communicated from a place of concern. Moreover, the ways in which support recipients use memorable support messages may evolve over time as well, with some recipients ruminating on negative statements while others utilize these negative statements as motivation for self-reflection and personal growth.

The sample's demographics were both a strength and a weakness. One strength is that the average age and self-reported ethnicities of the participants were approximately representative of the metropolitan area from which the sample was drawn. Additionally, whereas the most commonly reported ethnicity was White, a majority of the sample identified as nonwhite. Although no sample is a perfect representation of its population, it is worth noting that most samples in interpersonal communication research are predominantly White and from the United States (Afifi & Cornejo, 2020). The researcher readily acknowledges that regardless of how closely the sample matches the population of the metropolitan area where the study was conducted, and that White participants comprised a plurality of the sample, all participants were born in or lived in the United States at the time of participation. Therefore, the findings from this study are geographically bound.

Conclusion

This study expanded recent research on mixed messages—instances when emotional support messages consist of both positive and negative statements. Findings from this study suggest that positive statements within mixed messages are less memorable than negative statements within the same messages. Furthermore, recalling negative statements three days after receiving mixed messages predicted message evaluations and affective improvement, whereas the recall of positive statements within mixed messages did not predict these outcomes. This is important considering emotional support messages are often recalled and reused throughout the coping process, especially when coping with stressors that linger for months or years such as a family member being diagnosed with cancer. Therefore, future research should look at the lifespans of supportive messages to understand what statements within support messages are memorable or forgotten, and why. Such research could also explore how people extend the lifespan of supportive messages by reusing and repurposing memorable messages of support as they cope with cancer and other chronic stressors over an extended period of time.

Note

1. By conducting the analyses for H3 and the research question in separate regressions, I can provide a clearer test of both the negativity bias argument (H3) and the positivity bias argument (RQ). When the data was analyzed using hierarchical regressions that included the recall of both positive and negative idea units in the same block, the same pattern of results occurred.

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No potential conflict of interest was reported by the author(s).

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