

## ORIGINAL ARTICLE

# The Implications of Computer-Mediated Communication (CMC) for Social Support Message Processing and Outcomes: When and Why Are the Effects of Support Messages Strengthened During CMC?

Stephen A. Rains, Steven R. Brunner, Chelsie Akers, Corey A. Pavlich, & Eric Tsetsi

Department of Communication, University of Arizona, Tucson, AZ 85721, USA

*Widespread use of computer-mediated communication (CMC) for exchanging social support has raised questions about the support-related implications of CMC. This study drew from the dual-process theory of supportive message outcomes and examined the implications of CMC for support message processing and outcomes. We hypothesized that the reduced social cues in CMC would encourage greater elaboration on support message content and lead support messages to have a greater impact than in face-to-face interaction. The results of the experiment showed that, although the support message was held constant, participants in the CMC condition reported the strongest motivation to receive support, engaged in the greatest level of message elaboration, and experienced the most beneficial changes in worry and uncertainty discrepancy.*

**Keywords:** Social Support, Computer-Mediated Communication, Dual-Process Theory of Supportive Message Outcomes.

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Social support is an important resource for coping with a variety of challenges. Indeed, a plethora of evidence exists to demonstrate the salutatory effects of social support on physiological functioning and psychosocial well-being (for a review, see Uchino, 2004). Although supportive communication is typically studied in face-to-face interaction (Goldsmith, 2004; MacGeorge, Feng, & Burleson, 2011), recent national surveys have documented the relatively widespread use of computer-mediated communication (CMC) for exchanging social support (National Cancer Institute, 2013). A Pew Internet and American Life Project survey showed that almost one in five adult American Internet users have gone online specifically to acquire health-related peer

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Corresponding author: Stephen A. Rains; e-mail: srains@email.arizona.edu

support (Fox, 2011). Researchers examining the implications of peer support have investigated online support communities (Mo & Coulson, 2010), blogs (Sanford, 2010), social network sites (Wright, 2012), and virtual worlds (Green-Hamann & Sherblom, 2014) among other contexts. Despite the growth in this body of research, fundamental questions about computer-mediated support remain unanswered.

One pressing question involves the implications of computer-mediation for support processes and outcomes. CMC can be unique from face-to-face interaction in several important ways (for reviews, see Caplan & Turner, 2007; Tanis, 2008; Wright & Bell, 2003). Perhaps most notably, many of the social cues available in face-to-face interaction (e.g., eye contact, vocalics, facial expressions) are reduced or absent in CMC. Walther and Parks (2002, p. 545) referred to the reduction in social cues as one of two “structural aspects of social support” that are “fundamentally changed” by CMC. As communication technologies continue to evolve, the reduction in social cues is likely to remain an important variable. Although several scholars have discussed the potential implications of a reduction in social cues (Caplan & Turner, 2007; Tanis, 2008; Wright & Bell, 2003), relatively little research has examined their impact on support processes and outcomes. Moreover, the few studies that have been conducted to investigate the effects of exchanging social support in CMC relative to face-to-face interaction have reported inconsistent findings. CMC has been shown to have both positive (Cohen & Kerr, 1999; Cook & Doyle, 2002) and negative (High & Solomon, 2014; Lewandowski, Rosenberg, Parks, & Siegel, 2011) implications for support processes.

The present project advances previous research by focusing specifically on support recipients and examining how the reduction in social cues associated with CMC can impact the way in which recipients process support messages and the outcomes of supportive interaction. Using the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010) as a foundation, we argue that the reduced social cues in CMC enhance a support recipient’s ability and, via increased attention to their stressor, motivation to receive support relative to face-to-face interaction. Increased motivation and ability encourage greater elaboration on support messages and, ultimately, bolster the outcomes of those messages in CMC. The results of this project offer potentially important insights about the implications of the reduced social cues associated with CMC for support processes. Such insights can inform theory-building efforts regarding social support and CMC and help to understand better the conditions under which CMC offers a more or less beneficial context for social support relative to face-to-face interaction.

## **Social support and CMC**

Social support has been a longstanding topic of interest among scholars spanning a range of disciplines (for a review, see MacGeorge et al., 2011). Typically conceptualized as a form of helping behavior (Burleson & MacGeorge, 2002),

social support has been described as communication that serves to manage uncertainty and foster a sense of control in one's life (Goldsmith & Albrecht, 2011). Person-centeredness is an important way in which support messages may vary and involves the degree to which messages acknowledge, elaborate, and legitimize the recipient's thoughts and feelings (Burlleson, 1982). Messages that contain high levels of person-centeredness produce salutary effects by fostering reappraisal of a stressor (Burlleson & Goldsmith, 1998; Jones & Wirtz, 2006).

Although the majority of social support research has involved face-to-face interaction, scholars have become increasingly interested in the implications of CMC. Much of this work has focused on documenting the types of supportive messages shared in computer-mediated contexts (for a review, see Rains, Peterson, & Wright, 2015). Other research has considered the outcomes associated with acquiring social support online. Cross-sectional studies of online support community members (Mo & Coulson, 2010) and social network site participants (Wright, 2012) have shown that the support acquired in these settings is associated with well-being. Lacking from this body of research, however, are focused and sustained efforts to understand better the unique implications of CMC relative to face-to-face interaction for supportive communication. Despite the claims made by several scholars about the important role that the reduction in social cues associated with CMC may play in social support processes (Caplan & Turner, 2007; Tanis, 2008; Walther & Parks, 2002; Wright & Bell, 2003), relatively few studies have been conducted to isolate the support-related effects of this cue reduction.

Across two cross-sectional studies, CMC has been linked with both less effective self-reported coping efforts (Lewandowski et al., 2011) and more effective interactions with support providers (Cook & Doyle, 2002) than face-to-face interaction. The results from experimental studies are no more consistent. In one study, 24 undergraduate students participated in counseling sessions about managing anxiety conducted either face-to-face or via CMC by graduate students in counseling psychology (Cohen & Kerr, 1999). Participants in the CMC (i.e., instant messaging) condition reported less arousal than those in the face-to-face condition, but there were no other differences between the two groups in evaluations of the interaction or support provider or in the degree to which participants' state anxiety was reduced. More recently, High and Solomon (2014) had participants discuss a stressor either face-to-face or using instant messaging with a friend who offered high, medium, or low levels of person-centered support. They found that high person-centered support from males was perceived to be more sensitive in CMC than face-to-face. Among females, low person-centered support in CMC interactions was rated as being lower-quality and fostered less self-reported improvement 3 weeks after the experiment than when the supportive interactions were conducted face-to-face.

Taken as a whole, these studies do not offer any consensus about the effects of CMC on support processes and outcomes. In considering these results, however, we would note that the support messages received and specific stressors discussed by participants were typically not held constant within studies. The failure to do so

makes it impossible to rule out potential confounds related to stressors or support messages. More broadly, the mixed findings from these studies underscore the need to examine specific aspects of supportive communication in which particular dimensions of CMC may be important. In this project, we focus on the implications of reduced social cues specifically for support recipients and examine the way in which support recipients discuss stressors and process support messages. Drawing from the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010), we argue that the reduced social cues in CMC can enhance a support seeker's ability and motivation to process a support message, thereby encouraging greater elaboration on that message and bolstering its (positive or negative) effects relative to face-to-face interaction.

### **The implications of reduced social cues for support message processing and outcomes**

One place where the reduced social cues in CMC may be particularly important is in how support recipients process support messages. The dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010), which is rooted in research on persuasive message processing (Chaiken, 1980; Petty & Cacioppo, 1986), offers an explanation for the variation in support message effects. The notion of message elaboration, or the degree to which individuals attend to message content, is central to the model. Support recipients' motivation and ability to process a support message determines the degree to which they will elaborate on message content and the ultimate impact of that message. Motivation is influenced by situational factors, such as problem severity, as well as individual-difference factors like locus of control. Ability is similarly determined by situational (e.g., distraction) and individual-difference (e.g., communication competence) factors. Support message content is predicted to have the greatest impact on recipients when both motivation and ability to receive support are high. As such, the effects of high person-centered support messages are expected to be the strongest or most positive when message elaboration is high and weakest or least positive when elaboration is low.

The dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010) can help to understand the implications of the reduced social cues in CMC during supportive interactions. An important way that the reduced social cues in CMC may impact support processes is by increasing support recipients' attentional resources. In explaining the hyperpersonal communication model, Walther (1996) argued that the lack of nonverbal cues in CMC allows individuals to allocate greater cognitive resources to message construction. Because they have less responsibility for managing nonverbal behavior (e.g., eye contact) relative to face-to-face interaction, individuals using CMC may pay greater attention to articulating their thoughts and feelings as well as the messages received from a communication partner. The ability to dedicate greater attentional resources may be particularly critical during supportive interaction where support recipients can face

significant challenges related to managing self-presentational (Goldsmith, 1994) and relational (Wright & Miller, 2010) concerns.

The potential for reduced demands on a support recipient's attentional resources in CMC relative to face-to-face interaction may impact the ability and motivation factors identified in the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010). First, the reduced social cues in CMC may increase a support recipient's ability to attend to a support provider's message(s). The dual-process theory of supportive message outcomes conceptualizes ability as one's capability and opportunity to process a message (Bodie & Burleson, 2008; Burleson, 2010). Ability is manifested in one's capacity to decode a support message. Most relevant to the present study, ability can be influenced by situational factors ranging from competing tasks or distractions that affect one's cognitive resources to the complexity of a message (Petty & Wegner, 1998). Through reducing the number of interactional features to which one has to attend (e.g., making eye contact, managing facial expressions), the reduced social cues in CMC may serve as a situational factor that increases one's ability to process a support message relative to face-to-face interaction. CMC may allow for additional attention to be directed at decoding a support message.

Second, the potential to allocate greater attentional resources in CMC relative to face-to-face interaction may serve to heighten one's attention to a stressor and, in turn, motivation to process a support message. The reallocation of resources in CMC has been linked with increased self-reflection (Walther, 2007). Independent of the hyperpersonal model, there is also evidence that the reduction in social cues in CMC may promote private self-awareness in which individuals become more attuned to their internal states (Matheson & Zanna, 1988; Sassenberg, Boos, & Rabung, 2005). Private self-awareness is a form of self-focused attention that, in the context of CMC, has been shown to encourage self-focused behavior such as self-disclosure (Joinson, 2001). When discussing a stressor, the potential for increased self-focused attention stemming from the reduced social cues in CMC may serve to encourage support recipients to more fully engage their thoughts and feelings about the stressor relative to a commensurate face-to-face interaction. Language reflecting emotions and sense-making (e.g., causation words) plays a central role in the reappraisal process during supportive interactions (Jones & Wirtz, 2006). In research examining CMC use among people coping with illness, such forms of language indicated engagement with emotions surrounding a stressor and attempts at better understanding the stressor (Rains & Keating, 2015; Shim, Cappella, & Han 2011).

The greater attention to one's stressor in CMC may ultimately serve to increase a support recipient's motivation to process a support message. Motivation refers to one's willingness to process a support message in the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010). One important set of situational factors proposed to increase motivation includes the severity of a stressor and intensity of negative affect it causes (Bodie & Burleson, 2008). Although we are

not arguing that CMC necessarily increases upset or perceived severity, we do contend that the reduced social cues in CMC can focus one's attention on the stressor and make it more salient. The salience of one's stressor may be akin to outcome-relevant involvement in dual-process theories of persuasive message processing (Johnson & Eagly, 1990) and serve to increase one's motivation to elaborate on a support message.

To summarize, the goal of this project is to isolate and understand better the implications of the reduced social cues associated with CMC for support message processing and outcomes. To this point, we have argued that, relative to face-to-face interaction, discussing a stressor in CMC increases a support recipient's ability and, by virtue of making the stressor more salient, motivation to process support messages. Drawing from the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010), we contend that increased motivation and ability impact message elaboration. Recipients who have high levels of motivation and ability are most likely to scrutinize support message content. Relative to face-to-face interaction, increased elaboration in CMC should serve to intensify the effects—whether salutary or detrimental—of support messages. In the case of high person-centered support, greater elaboration in CMC should lead messages to be more effective in ameliorating a stressor than in face-to-face interaction. Similarly, low person-centered support should be *less* effective in CMC than face-to-face.

An important caveat is that we are not arguing that using CMC for supportive interaction inherently leads to positive or negative outcomes. Rather, the reduced social cues in CMC impact support outcomes indirectly by encouraging a support seeker to elaborate on support message content. Consistent with the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010), it is the quality of support messages that ultimately determine the nature and valence of support outcomes under the condition of high elaboration.

Testing the preceding argument requires, at a minimum, holding constant the nature of the support message and evaluating the difference between supportive interactions completed face-to-face and via CMC. To this end, we used a message with high person-centered elements in this study; High and Dillard's (2012) meta-analysis offered robust evidence such messages are associated with salutary effects on coping. Additionally, we used message evaluation as an indicator of elaboration. The results of Bodie, Burleson, and Jones's (2012; Study 2) research suggested that evaluations of a message with high person-centered elements would be most positive when elaboration is high. Finally, in an effort to isolate the effects of attentional resources in CMC, this study included a third condition (CMC-task) in which participants simultaneously completed the supportive interaction in CMC along with a basic task designed to dampen their attentional resources (e.g., Stroop, 1935). By restricting their attentional resources in CMC, the CMC-task condition was expected to produce effects similar to face-to-face interaction.

The predictions made thus far can be summarized as follows: We expected participants in the CMC condition to report greater perceived ability to receive support; give

greater attention to their stressor, as indicated by language reflecting sense-making and emotions about the stressor; report greater motivation to receive support; and evaluate the support message more positively than participants in the CMC-task and face-to-face conditions.

H1: Participants in the CMC condition will (a) report greater ability to receive support, (b) be more likely to use language that reflects sense-making (i.e., insight and causation words) and feelings (i.e., positive and negative emotion words), (c) report greater motivation to receive support, and (d) evaluate the support message more positively than in the face-to-face or CMC-task conditions.

Beyond evaluating the message more positively, increased elaboration in the CMC condition should intensify the effects of that message on support outcomes relative to face-to-face interaction. Following Goldsmith and Albrecht's (2011) definition of social support as communication that helps to manage uncertainty and foster a sense of control in one's life, the outcomes of the supportive interaction were evaluated by assessing participants' change in worry, self-efficacy, and uncertainty discrepancy regarding the stressor. In addition to three conditions used to test the previous hypotheses, we included a fourth, baseline condition (i.e., baseline) to evaluate the efficacy of the support message used in the other conditions. The baseline condition made it possible to demonstrate that the support message used in this study was effective in ameliorating the stressor experienced by participants. In the baseline condition, participants did not receive the support message.

Our predictions regarding support outcomes can be summarized as follows: Because the CMC condition was argued to foster the greatest levels of motivation and ability to process a support message, participants in this condition were expected to experience the greatest improvement from receiving the support message. The CMC-task and face-to-face conditions were expected to fall between the CMC and baseline conditions. Because there was no support message, participants in the baseline condition were expected to experience the least amount of improvement.

H2: Participants in the CMC condition will experience the most beneficial changes in (a) worry, (b) uncertainty discrepancy, and (c) self-efficacy from the supportive interaction followed by participants in the face-to-face and CMC-task conditions. Participants in the baseline condition will experience the least beneficial changes in the three outcomes.

## Method

### Participants

The sample consisted of 135 undergraduate students. However, the scores from three participants who failed to follow the instructions were excluded. Of the remaining 132 participants, 86 were female (65%), and the mean age was 20 years ( $SD = 1.47$  years). The average participant was within four semesters of graduation ( $M = 3.88$ ,  $SD = 1.60$  semesters).

### Design

Four conditions were used to test the hypotheses: face-to-face ( $n = 30$ ), CMC ( $n = 34$ ), CMC-task ( $n = 33$ ), and baseline ( $n = 35$ ). In the experimental conditions, participants discussed a stressor with a research assistant and received social support either face-to-face, via CMC, or via CMC while completing a secondary task designed to reduce their attentional resources. In the baseline condition, participants discussed the same issues regarding their stressor as in the other conditions but did so independently in an online questionnaire and did not receive the support message. In all conditions, the measures of support outcomes (i.e., worry, self-efficacy, and uncertainty discrepancy) were completed prior to and following the participants' discussion of their stressor.

### Procedure

Upon arriving at the lab, participants were greeted by a research assistant (RA1) who introduced the project by explaining that the goal was to better understand challenges experienced by undergraduate students. Participants were given an initial questionnaire that included a series of items addressing three types of ongoing challenges: financial issues, academic problems, or an issue related to a close relationship. These three challenges were selected based on previous research (Jones & Guerrero, 2001) and the results of a pilot study ( $N = 30$ ) indicating that they were salient stressors faced by undergraduate students. Participants were first asked to report whether they were currently experiencing a challenge in one of these three areas. For each topic in which they were experiencing a challenge, participants then responded to four items evaluating their worry, self-efficacy, desired level of uncertainty, and actual level of uncertainty about the challenge. Participants were also asked to indicate their willingness to discuss each challenge. RA1 selected the challenge rated as the most worrisome and that participants were willing to talk about. RA1 then informed participants in the experimental conditions that a second research assistant (RA2) would like to discuss their challenge.

In the experimental conditions, participants were told they would be discussing the challenge face-to-face or using instant messaging. In the face-to-face condition, participants discussed the challenge with RA2 while sitting at a small conference table. The face-to-face interviews were (audio) recorded, and all participants consented to the recording. RA2 was trained so that his/her responses were natural and appropriate to the context. RA2's nonverbal behavior reflected a level of concern that might be expected in a conversation between two people meeting for the first time.

In the CMC and CMC-task conditions, participants were seated at a computer station, and the interaction with RA2 took place via instant messaging. In the CMC-task condition, however, a second computer monitor displaying images of geometric shapes was placed next to the computer participants used to communicate with RA2. Participants in the CMC-task condition were informed by RA1 that the project was also about multitasking and were asked to count the number of triangles that were displayed during their discussion with RA2. The geometric shapes took

up the majority of a 20-inch monitor and changed every 30 seconds. Again, the purpose of including the CMC-task condition was to attempt to restrict participants' attentional resources when discussing the stressor. To ensure that participants in the CMC and CMC-task conditions knew the sex of the interviewer, RA2's screen name was labeled as either "Michael/Michelle" (depending on the sex of RA2). It should be noted that no time limit was placed on the discussions with RA2 in any condition.

In the face-to-face, CMC, and CMC-task conditions, the interaction between RA2 and participants followed the exact same script. Participants were asked a series of seven questions about the stressor they were experiencing. The questions were developed to ensure that all participants would focus on and discuss similar aspects of their stressor (e.g., how they felt about it; how it affected other parts of their lives). After the second and fifth questions, RA2 made brief encouraging statements. However, the bulk of the support message was delivered after participants responded to the final question. This was done to isolate the effects of CMC on how participants talked about their stressor and separate these effects from the effects of the support message. Again, an identical support message was used across the three conditions. The support message was developed using data from a pilot study and designed to contain high person-centered elements (Burlleson, 1982) by recognizing and acknowledging participants' feelings about their stressor and helping them view their stressor from a new perspective. A great deal of effort was made to ensure that the support message was flexible enough to apply to the three categories of stressors and any specific response given by participants. The full script for the interaction is available in the Appendix.

In the baseline condition, participants were escorted to a computer terminal and completed the entire study independently via an online questionnaire. As in the other conditions, participants rated the degree to which the three stressors were currently salient, answered a series of seven questions about one of the stressors, and then completed measures of the dependent variables. The baseline condition was exactly the same as the other three conditions, except that participants did not receive the social support message nor did they interact with RA2.

## Measures

Unless otherwise noted, all items were rated on 7-point scales with larger values indicating a greater amount of a variable.

### *Perceived ability and motivation to receive support*

Perceived ability and motivation to receive support were each evaluated with two-item measures. The measure of ability evaluated participants' capability and opportunity to comprehend the support message (Bodie & Burlleson, 2008; Petty & Wegner, 1998). Participants reported their agreement that they fully understood the feedback they received from the confederate and had no problems understanding the questions asked by the confederate during the interaction. The mean of these two items was computed to form the measure of perceived **ability** to receive support

( $M = 5.82$ ,  $SD = 1.11$ ,  $\alpha = .75$ ). The motivation measure was adapted from previous research on the dual-process theory of supportive message outcomes (Bodie, 2011). Participants were asked to report the degree to which they wanted to hear feedback and were motivated to hear feedback from the confederate. The mean of these two items was computed and used as the measure of perceived **motivation** to receive support ( $M = 4.79$ ,  $SD = 1.46$ ,  $\alpha = .93$ ).

#### *Attention to the stressor*

Participants' discourse during the supportive interaction was used to evaluate their attention to the stressor they were experiencing. Transcripts of the discussions between participants and RA2 were analyzed using the Linguistic Inquiry and Word Count (LIWC; Pennebaker, Booth, & Francis, 2007) computer program. The LIWC is a content analysis program that counts the frequency of words from over 80 different content categories. Only the words spoken or written by participants were analyzed ( $M = 313.33$ ,  $SD = 219.49$ ). The LIWC reports the proportion of words in a text that fall into a given category.

Four categories of LIWC content were examined in this project: positive emotion ( $M = 4.13\%$ ,  $SD = 1.65$ ), negative emotion ( $M = 2.81\%$ ,  $SD = 1.46$ ), insight ( $M = 2.38\%$ ,  $SD = 1.32$ ), and causation ( $M = 2.28\%$ ,  $SD = 1.35$ ) words. The LIWC dictionary for the **positive emotion words** category contains 406 words (e.g., glad, proud) that reflect a positive affective state. The dictionary for **negative emotion words** contains 499 words (e.g., aggravate, fearful) reflecting a negative affective state. **Insight words** and **causation words** reflect sense-making. The insight words dictionary for LIWC contains 195 words that suggest that one is developing an understanding (e.g., realize, understand), whereas the causation word dictionary contains 108 words that indicate one is making connections (e.g., effect, because), such as between events or ideas.

#### *Message evaluation*

Participants' evaluation of the supportive message was assessed using a 14-item measure developed by Jones and Guerrero (2001). Participants were asked to rate semantic differential items reflecting the degree to which they felt the feedback they received was not beneficial/beneficial, uncaring/caring, etc. The mean of these items was calculated to form the measure of support **message evaluation** ( $M = 5.33$ ,  $SD = 1.01$ ,  $\alpha = .94$ ).

#### *Support outcomes*

Participants evaluated their stressor prior to and following the supportive interaction. Because participants were initially asked to rate up to three stressors, the pretest measures for worry and self-efficacy were shortened versions of the full scales used for the posttest measures. Prior to the interaction, **pretest worry** and **pretest self-efficacy** were evaluated using single-item measures. Worry was evaluated by asking participants to report, "How worried do you feel about this situation?"

( $M = 5.05$ ,  $SD = 1.16$ ), and self-efficacy was assessed by asking participants to rate, "How confident are you that you can successfully resolve the situation?" ( $M = 4.57$ ,  $SD = 1.35$ ). Participants' uncertainty discrepancy was evaluated by asking them to rate how uncertain they currently felt (i.e., actual uncertainty) and how uncertain they would prefer to have felt (i.e., desired uncertainty) about their stressor. Actual uncertainty was subtracted from desired uncertainty to create a **pretest uncertainty discrepancy** score ( $M = -2.57$ ,  $SD = 1.93$ ); negative values indicated participants felt more uncertainty about the stressor than they desired.

Participants completed posttest measures of these variables after the discussion with RA2. In addition to the single item used in the pretest, participants' posttest worry was assessed with two additional items originally developed by Folkman and Lazarus (1985). Participants rated how worried, fearful, and anxious they felt about their stressor. These three items were averaged to form the measure of **posttest worry** ( $M = 3.71$ ,  $SD = 1.74$ ,  $\alpha = .88$ ). In addition to the single self-efficacy item from the pretest, participants were asked to rate five additional items adapted from the generalized self-efficacy scale (Schwarzer & Jerusalem, 1995). Sample items included: "Even if my situation involving [my relationships/finances/academics] becomes more challenging, I know that I can deal with it," and "I can solve my situation with [my relationships/finances/academics] if I try hard enough." This 6-item scale was averaged to form the measure of **posttest self-efficacy** ( $M = 5.54$ ,  $SD = 1.21$ ,  $\alpha = .92$ ). The two items from the pretest measure of uncertainty discrepancy were also used for the posttest. Participants reported their actual and desired levels of uncertainty about the stressor after the discussion with RA2 and the difference between these two variables was computed to determine **posttest uncertainty discrepancy** ( $M = -2.75$ ,  $SD = 1.87$ ).

#### *Control variables*

Three control variables were used in testing the hypotheses. Descriptive information about participants' **sex** and **number of words** spoken/written during the interaction were reported previously. The **nature of the stressor** experienced and discussed by participants was also evaluated: financial issues ( $n = 30$ ), academic problems ( $n = 83$ ), or relationship difficulties ( $n = 19$ ). Because each of these factors has the potential to influence message processing and/or support outcomes, they were included as control variables to ensure that they did not have an undue influence on the results.

#### *Data analysis*

Because the hypotheses predicted that the results would follow a specific pattern, planned contrasts were used to analyze the data (Rosenthal & Rosnow, 1985). Contrast analysis makes it possible to assign weights to the groups being compared and thereby conduct a more focused test than an omnibus analysis of variance (ANOVA). Participants' sex, number of words spoken/written during the interaction, and the stressor topic (i.e., academics, relationships, or finances) were included as control variables in the analyses.

## Results

### Preliminary analyses

A series of preliminary analyses were conducted to demonstrate the efficacy of the manipulations and experiment. First, paired *t*-tests were conducted to determine if, overall, the supportive discussion with RA2 resulted in changes in participants' evaluations of their stressor. The results offer evidence that participants in the CMC, face-to-face, and CMC-task conditions experienced less worry ( $M_{\text{change}} = -1.82$ ),  $t(96) = -11.12$ ,  $p < .001$ , and greater self-efficacy ( $M_{\text{change}} = 1.09$ ),  $t(96) = 9.28$ ,  $p < .001$ , after the discussion. Although participants also experienced a decrease in uncertainty discrepancy, the change was not statistically significant ( $M_{\text{change}} = -.13$ ),  $t(92) = 0.60$ ,  $p = .55$ . These results offer evidence that, in general, the supportive interactions during the experiment helped to ameliorate the stressor experienced by participants.

Second, participants' perceptions of their attentional resources were evaluated. Participants rated the degree to which they were "keenly aware of everything in their environment" during the supportive interaction with the confederate. A contrast model was tested (with the weights in parentheses) reflecting the idea that participants in the CMC condition (+2) should report greater attentional resources than participants in the CMC-task (-1) or face-to-face (-1) conditions. Accounting for the three control variables (sex, words spoken/written, and stressor topic), the model was statistically significant,  $F(1, 91) = 4.09$ ,  $p = .046$ ,  $\eta^2 = .04$ , and the mean scores were consistent with expectations. Participants who completed the triangle-counting task when using CMC ( $M = 4.71$ ,  $SE = .23$ ) reported attentional resources commensurate with participants in the face-to-face condition ( $M = 4.66$ ,  $SE = .25$ ), but less attentional resources than participants in the regular CMC condition ( $M = 5.25$ ,  $SE = .22$ ). Finally, ANCOVAs were conducted to rule out any effects stemming from the sex of RA2. After controlling for the nature of the stressor discussed by participants, there were no significant differences in any of the dependent measures among participants in the CMC, face-to-face, and CMC-task conditions based on the sex of RA2. Zero-order correlations for the measured variables are reported in Table 1.

### Effects of reduced social cues on support message processing

H1 predicted that participants in the CMC condition would (a) report greater ability to receive support, (b) be more likely to use language that reflects sense-making (i.e., insight and causation words) and one's emotions (i.e., positive and negative emotion words), (c) report greater motivation to receive support, and (d) evaluate the support message more positively than in the face-to-face or CMC-task conditions. This hypothesis was tested using contrast analysis and the weights identified in Table 2.

#### *Perceived ability and motivation to receive support*

After accounting for the three control variables (participants' sex, number of words spoken/written, and stressor topic), the contrast model was significant for perceived

**Table 1** Zero-Order Correlations Among Measured Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12	13
1 Motivation													
2 Ability	.43*												
3 Positive emotion words	-.09	-.08											
4 Negative emotion words	-.09	.09	-.25 *										
5 Insight words	.03	-.16	.06	.08									
6 Causation words	.07	-.07	-.06	.04	.12								
7 Support message evaluation	.65*	.50*	-.12	.02	-.07	.07							
8 Uncertainty discrepancy pretest	.06	.09	.14	-.02	-.05	-.05	.15						
9 Uncertainty discrepancy posttest	.12	.09	.13	-.02	.01	.01	.19	.37*					
10 Worry pretest	.01	-.08	-.20*	.05	.07	.01	.02	-.32*	-.44*				
11 Worry posttest	-.16	-.12	-.26*	.13	.00	.11	-.21*	-.09	-.46*	.39*			
12 Self-efficacy pretest	.21*	.01	.15	-.17	.02	.03	.29*	.39*	.46*	-.37*	-.23*		
13 Self-efficacy posttest	.26**	.16	.22*	-.18*	.03	-.18*	.31*	.19*	.41*	-.32*	-.43*	.55*	

\* $p < .05$ .

motivation to receive support,  $F(1, 91) = 4.08, p = .046, \eta^2 = .04$ , but not for perceived ability,  $F(1, 91) = 0.001, p = .98, \eta^2 < .01$ . The mean scores reported in Table 2 are consistent with the prediction made in Hypothesis 1c. Participants in the CMC condition reported a greater level of motivation to receive the support message than participants in the CMC-task and face-to-face conditions. H1a was not supported. The observed means for perceived ability to receive support were similar across all three conditions.

#### *Attention dedicated to the stressor*

The language used by participants in discussing the stressor served to evaluate their attention to the stressor. The contrast model for insight words was significant,  $F(1, 91) = 15.88, p < .001, \eta^2 = .15$ . The means reported in Table 2 show that participants in the CMC condition used a greater proportion of insight words during the interaction than in the other two conditions. Although the mean scores for causation words were consistent with expectations, the contrast model was not statistically significant,  $F(1, 91) = 3.04, p = .085, \eta^2 = .03$ . The contrast models for negative emotion words,  $F(1, 91) = 0.20, p = .66, \eta^2 = .001$ , and positive emotion words,  $F(1, 91) = 0.18, p = .68, \eta^2 = .002$ , were not significant. Taken together, these results offer mixed support for Hypothesis 1b.

**Table 2** Means and Standard Errors for All Dependent Variables Across Conditions

	CMC		CMC-Task		Face-to-face		Baseline	
	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>	<i>M</i>	<i>SE</i>
Perceived ability	5.81	.20	5.89	.20	5.75	.22		
Perceived motivation	5.20	.25	4.65	.26	4.48	.28		
Causation words	2.36	.18	2.02	.19	1.91	.20		
Insight words	2.85	.18	1.98	.18	1.98	.19		
Positive emotion words	4.51	.25	4.34	.25	4.43	.27		
Negative emotion words	2.51	.19	2.62	.20	2.18	.21		
Message evaluation	5.61	.17	5.39	.18	4.94	.19		
Planned contrast values	+2		-1		-1			
Worry change	-2.12	.26	-1.96	.26	-1.36	.29	.14	.29
Uncertainty discrepancy change	-.58	.38	-.02	.38	.08	.42	.96	.41
Self-efficacy change	1.14	.22	1.14	.22	1.19	.24	.58	1.04
Planned contrast values	+2		+1		+1		-4	

*Note.* The mean scores and standard errors (*SE*) are reported while controlling for participants' sex, number of words spoken/written, and the general topic of the stressor they discussed.

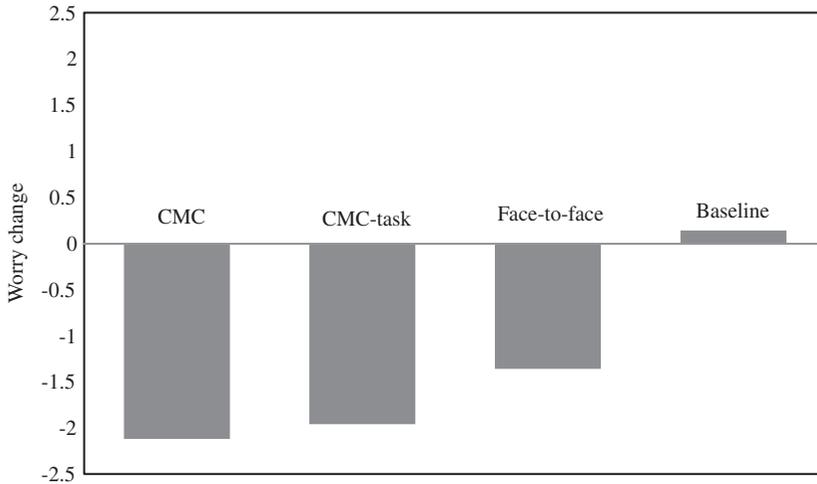
### *Support message evaluation*

The contrast model was significant for evaluations of the support message,  $F(1, 91) = 4.37$ ,  $p = .04$ ,  $\eta^2 = .04$ , and the mean scores followed the predicted pattern. Participants in the CMC condition evaluated the support message more positively than participants in the CMC-task or face-to-face conditions. These results are consistent with Hypothesis 1d.

### **The implications of CMC for support outcomes**

H2 predicted that participants in the CMC condition would experience the most beneficial changes in (a) worry, (b) uncertainty discrepancy, and (c) self-efficacy followed by participants in the face-to-face and CMC-task conditions. Participants in the baseline condition were expected to experience the least beneficial changes in the three outcomes. Change scores were first computed for the measures of worry ( $M = -1.34$ ,  $SD = 1.68$ , range =  $-5.67$  to  $1.67$ ), uncertainty discrepancy ( $M = -0.13$ ,  $SD = 2.13$ , range =  $-7.00$  to  $5.00$ ), and self-efficacy ( $M = 0.97$ ,  $SD = 1.21$ , range =  $-2.83$  to  $5.00$ ) by subtracting scores for each respective variable prior the interaction from scores after to the interaction. Negative values indicated that a variable decreased as a result of the interaction.

Using the weights identified in Table 2 and the three control variables (i.e., sex, words spoken/written, and stressor topic), the results of the contrast model for change in worry was statistically significant,  $F(1, 120) = 4.27$ ,  $p = .04$ ,  $\eta^2 = .03$ . As can be seen in Figure 1, the mean scores were generally consistent with H2a. The greatest change in worry occurred in the CMC condition, followed by the CMC-task and face-to-face conditions. In each of these three conditions, participants experienced a statistically



**Figure 1** Change in worry from pre to posttest across the four conditions.

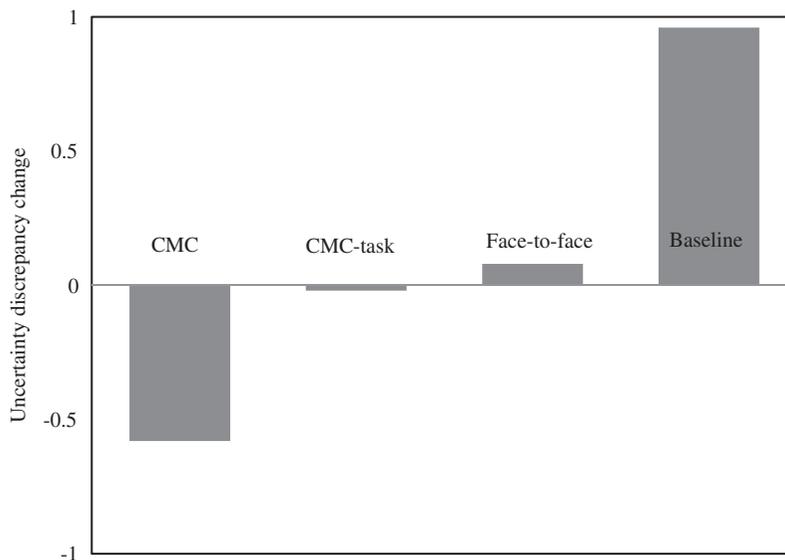
significant decrease in worry from before to after the interaction with the confederate; participants in the baseline condition did not experience a significant change in worry.

The contrast model for uncertainty discrepancy was also statistically significant,  $F(1, 120) = 26.32, p < .001, \eta^2 = .16$ . The mean scores illustrated in Figure 2 are generally consistent with H2b. Participants in the CMC condition experienced the greatest decrease in uncertainty discrepancy followed by participants in the CMC-task and face-to-face conditions. The change in uncertainty discrepancy from before to after the interaction was only significant in the baseline condition. Participants experienced significantly greater uncertainty discrepancy at the conclusion of the baseline condition than the beginning.

Finally, although the contrast model for self-efficacy was statistically significant,  $F(1, 120) = 3.97, p = .048, \eta^2 = .03$ , the mean scores in Figure 3 were not consistent with H3c. The significant contrast model appears to be an artifact of participants in the control condition experiencing the least positive change in self-efficacy. Participants in each of the four conditions experienced a significant increase in perceptions of self-efficacy from the beginning to end of the experiment.

## Discussion

The purpose of the present study was to understand better the implications of the reduced social cues in CMC for support message processing and the outcomes of supportive interactions. Drawing from the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010), we argued that the reduced social cues in CMC could serve to enhance a support recipient's ability and, via increased attention to their stressor, motivation to process a support message. Increased message elaboration in CMC was proposed to bolster the effects of a support message



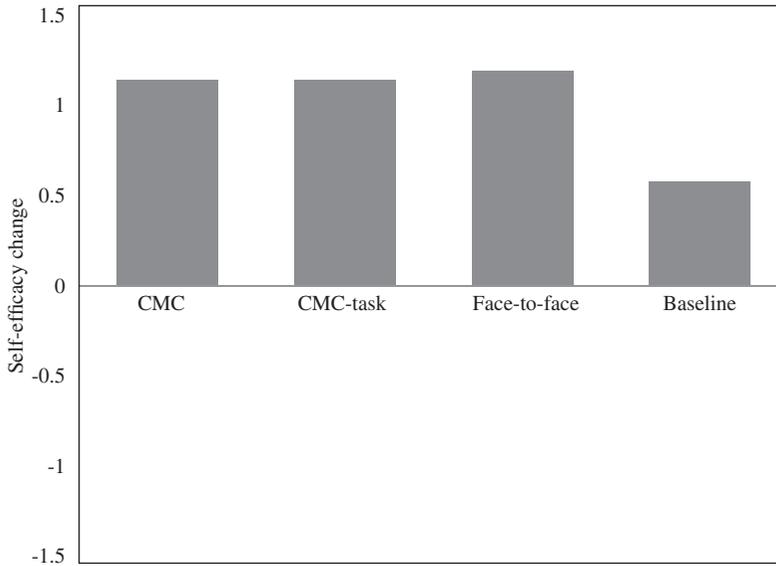
**Figure 2** Change in uncertainty discrepancy from pre to posttest across the four conditions.

relative to face-to-face interaction. The findings from the experiment conducted to test these ideas are considered in the following paragraphs.

### **The implications of reduced social cues for support message processing and outcomes**

The results showed that the reduced social cues in CMC were more consequential for motivation than ability to receive support. Participants in the CMC condition were more motivated to process the support message than those in the CMC-task or face-to-face conditions. Additionally, there was tentative evidence that the reduced social cues in CMC encouraged greater attention to some aspects of the stressors experienced by participants. Compared to participants in the CMC-task and face-to-face conditions, participants in the CMC condition used a significantly larger proportion of insight words in describing their stressor. Although the results for causation words followed the same trend, the contrast model was not significant nor were the contrast models significant for positive and negative emotion words. The reduced social cues in CMC also did not impact perceived message-processing ability. In considering these findings we would note that, because the results in the CMC-task condition were generally commensurate with those in the face-to-face condition, readers can be reasonably confident that the effects of reduced social cues in CMC stem from the relative demands placed on participants' attentional resources. We return to this issue in considering the implications of the findings for research on social support and CMC.

We further predicted that the reduced social cues in CMC would encourage participants to elaborate on the support message. To reiterate, because the exact same



**Figure 3** Change in self-efficacy from pre to posttest across the four conditions.

support message was used in the CMC, face-to-face, and CMC-task conditions, participants' evaluation of message quality was used as an indicator of elaboration. Such an assumption is consistent with the findings from recent research examining support message processing and evaluation (Bodie et al., 2012). As expected, participants rated the message most positively in the CMC condition. These findings suggested that participants in the CMC condition elaborated to a greater degree on the support message than participants in the other two conditions. In more closely attending to the support message, participants in the CMC condition were better able to recognize its high person-centered components and, as a result, evaluated the message more positively.

The reduced social cues in CMC were expected to ultimately lead to more beneficial support outcomes than in the face-to-face or the CMC-task conditions. A fourth, baseline condition was included to isolate the effects of the support message used in the other conditions. The results offered some evidence that the effects of the support message were strongest in CMC. Participants in the CMC condition reported the greatest decrease in worry and uncertainty discrepancy, and participants in the baseline condition experienced the least beneficial changes in these two variables. The findings for self-efficacy, however, were not consistent with expectations. We would note that participants' perceptions of the stressor were evaluated before and after the supportive interaction. This approach made it possible to identify more precisely the effects of the support message across the four different conditions and account for differences in the initial magnitude of the stressor experienced by participants.

Those hypotheses that were not supported also merit consideration. Although the reduced social cues in CMC had implications for motivation and elaboration, they did not impact participants' perceptions of their ability to process the support message. Given the role of ability in dual-process theories of persuasion (Chaiken, 1980; Petty & Cacioppo, 1986), this finding is perhaps not surprising. Ability typically receives less attention than motivation and less frequently plays a significant role in processing outcomes. The additional attentional resources required to manage one's nonverbal behavior in face-to-face interaction relative to CMC may not be significant enough to influence perceptions of one's capacity to decode a message.

CMC also had no impact on participants' use of emotion words. This finding may be an artifact of the questions asked by the confederate. Because all participants were asked how the stressor made them feel, to elaborate on their feelings, and what about the situation bothered them, the variance in participants' use of emotion words may have been artificially restricted. Asking participants to discuss the stressor about which they were most troubled may have further served to restrict the variance in emotion words. In focusing on their most significant source of worry, participants may have been especially likely to talk about negative emotions and unlikely to consider any positive emotions related to the stressor.

The reduced social cues associated with CMC did not impact participants' feelings of self-efficacy to cope with the stressor. The results in Figure 3 offer evidence that simply discussing the stressor bolstered participants' feelings of self-efficacy to manage it and the support message further increased efficacy perceptions. Finally, it is noteworthy that the effect estimates for the statistically significant contrast models were small. However, they are consistent with previous experimental research examining the outcomes of enacted support in dyadic interaction (e.g., Jones & Wirtz, 2006). Moreover, the widespread use of CMC use for seeking peer support (Fox, 2011; National Cancer Institute, 2013) suggests that even small effects on support message processing and outcomes are likely to be meaningful.

### **CMC and supportive communication**

The results of this study have several implications for the broader bodies of scholarship investigating CMC and supportive communication. First, the findings from this project add to the small number of studies that have examined the effects of CMC relative to face-to-face during supportive interactions (Cohen & Kerr, 1999; High & Solomon, 2014; Lewandowski et al., 2011). Beyond simply testing the effects of CMC, this project helped to identify when and why the reduction in social cues impact support processes and explain some of the inconsistencies in prior research. The reduced social cues in CMC appear to play a role in support reception through freeing up attentional resources typically used by support recipients in managing their nonverbal behavior. Because they do not have to focus on making eye contact with a support provider or nonverbally communicating interest, support recipients in CMC can dedicate more attention to aspects of the stressor and may feel more motivated to

receive support. This greater motivation encourages elaboration on the support messages received and ultimately serves to bolster the effects of those messages relative to face-to-face interaction.

An important caveat is that the degree to which a support message has salutary effects depends upon its quality. Although the message used in this study contained high person-centered elements and facilitated participants' coping efforts, it is equally likely that the effects of a low-quality support message would also be magnified in CMC. Indeed, High and Solomon (2014) found that low person-centered support messages were less effective in promoting coping among women in their study in the CMC condition than face-to-face. The discrepant findings regarding the effects of CMC on the outcomes of supportive interaction may stem from the quality of the support messages employed in previous research.

Second, this project helps advance our understanding of the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010). Although several experimental tests of the theory exist (e.g., Bodie, 2011; Bodie et al., 2012), the present study appears to be one of the first involving enacted support during dyadic interaction. The findings underscored the important role of motivation in elaboration. Despite receiving the exact same support message, the results of this study offered evidence that message elaboration was greatest in the condition where motivation was highest. We believe it is noteworthy that, although the CMC-task condition appeared to restrict participants' attentional resources, it did not impact perceptions of their ability to process the message. Perhaps perceptions of ability to process a support message are only affected by factors that cause a nontrivial burden. The results also serve to advance the dual-process theory of supportive message outcomes by incorporating consideration of the communication medium. Face-to-face interaction appeared to be a scope condition in prior discussions of the theory (Bodie & Burleson, 2008; Burleson, 2010). Although such an approach is understandable, considering the medium can expand this theory to account for the millions of adults who use forms of CMC to acquire social support (Fox, 2011; National Cancer Institute, 2013).

Finally, the results of this project have implications for theorizing about the role of CMC in interpersonal interaction. Although claims about the possibility of less burden on a communicator's cognitive resources stemming from the reduced social cues in CMC can be traced back to at least the origins of the hyperpersonal communication model (Walther, 1996), relatively little research has directly examined this idea. The results of this project demonstrated that, in the context of seeking social support, this aspect of CMC has important consequences for message processing and the outcomes of supportive interaction. There is some evidence that reduced social cues were responsible for support recipients' heightened attention to aspects of their stressor and motivation to process the support message they received and, ultimately, the greater effects of that message. More broadly, because the dual-process theory of supportive message outcomes (Bodie & Burleson, 2008; Burleson, 2010) is an extension of theories developed to explain how persuasive messages are processed (Petty &

Cacioppo, 1986; Chaiken, 1980), the effects observed in this study may also occur in that context.

### **Limitations**

In addition to the findings, the limitations of this study warrant consideration. One limitation involves the scripted nature of the supportive interaction during the experiment. Such an approach, however, was essential to rule out potential confounds. An important limitation of prior research examining the effects of CMC on support outcomes is that, in failing to hold the support messages and/or stressors constant, it is not possible to isolate the effects of CMC relative to face-to-face interaction. Moreover, there is evidence that the scripted nature of the experiment was not a major limitation. Paired *t*-tests showed that, as a whole, participants in the CMC, CMC-task, and face-to-face conditions experienced a reduction in worry and increased self-efficacy after the interaction.

A second possible limitation is that participants discussed the stressor with a confederate who was a stranger. Whether the results reported in this study can be replicated among friends or family members remains to be seen. Yet, the approach used in the present project has been employed in previous support research (Jones & Guerrero, 2001) and was essential in order to hold constant the support message received by participants. More important, there is reason to believe that supportive interaction among strangers is fairly pervasive in CMC. Studies of participation in online communities offer compelling evidence that one-time-only interactions are common in this context (Jones, Ravid, & Rafaeli, 2004; Joyce & Kraut, 2006).

Finally, some might argue that several of the message features used during the supportive interaction represent moderate person-centered support based on Burleson's (1982) typology. Although such a critique is reasonable, we would note that the bulk of the interaction consisted of high person-centered elements and that the support message was held constant across the various conditions. Additionally, the improvements in worry and self-efficacy reported in the preliminary analyses are consistent with what one would expect from high levels of person-centered support.

### **Conclusion**

The substantial number of individuals who seek social support using various forms of CMC make it critical to better understand the support-related implications of computer-mediation. This project examined the consequences of the reduced social cues associated with using CMC on support message processing and outcomes. The results offered evidence that the reduced social cues in CMC encouraged greater message elaboration and bolstered the effects of the support message on support recipients' coping efforts. In addition to highlighting the effects of the reduced social cues in CMC on supportive interactions, the results of this project underscore the need for additional research. Although the focus of this study was on support recipients, it is likely that CMC also has important implications for other dimensions

of enacted support. Fully understanding the role of CMC in supportive communication requires examining support providers as well as the interdependent nature of providers and recipients. Such efforts would help to yield a more robust body of social support research.

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## Appendix: Script for RA2

Hi. I think [RA1] told you a little about the project. We are trying to better understand challenges faced by undergraduate students. I'd like to discuss a recent challenge that you faced. Before we begin let me ask if it is okay if I record this interview. I'm going to take some notes, but I can't write as fast as you can talk. Recording it will save some time. I won't ask your name, so your responses will be completely anonymous. Is that okay with you?

Great. Let's begin ...

- How is your semester going so far?
- All right. Can you please tell me about your situation with [academics/finances/relationships]. What specifically is going on?

Response: That sounds challenging.

- How does that make you feel?
- Can you elaborate on that?
- What about this situation bothers you?

Response: That would definitely bother me too.

- Do you think that this situation is a symptom of a larger issue?
- How has this situation affected other parts of your life?
- How have others such as friends or family been involved in this situation?

Final response: I can see how this is a challenging situation. It sounds like you're pushing through it. That means you're a strong person. I bet a time will come in the future when you can look back and see that you've grown as a result of this experience.

When I've had similar experiences, the best way for me to get through them is to focus on a plan. Developing an actual plan to follow always helps me to stay focused and ends up making things much easier.

Just from talking with you today, I get the feeling that you'll make something good out of this situation. As they say, this too shall pass.