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Expressive talking among caregivers of hematopoietic stem cell transplant survivors: acceptability and concurrent subjective, objective and physiologic indicators of emotion

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Abstract

This study sought to examine the effects of an expressive talking intervention for 58 caregiving partners of hematopoietic stem cell transplant survivors, persons known to experience distress. Caregivers were randomly assigned to a 3-session emotional expression (EE) or control condition. Subjective, objective and physiologic indicators of emotion were assessed. Relative to controls, EE participants experienced more negative emotion, uttered more negative emotion words, and perceived the exercises as more helpful and meaningful. The trajectory of skin conductance and the use of cognitive mechanism words increased across EE sessions, suggesting sustained emotional engagement. Future research is warranted to determine the optimal dose and timing of EE for this population.

Keywords

caregiver; emotional expression; negative affect; skin conductance; oncology

INTRODUCTION

Hematopoietic stem cell transplantation (HSCT), used for the treatment of hematologic malignancies and other blood disorders, is physically, psychologically, and socially demanding (Andrykowski et al., 2005; Baker, Zabora, Polland, & Wingard, 1999; Martin et al., 2010; Mosher, Redd, Rini, Burkhalter, & DuHamel, 2009; Syrjala et al., 2004; Syrjala,

Martin, Deeg, & Boeckh, 2006). Family caregivers are also greatly affected by the process (Bishop et al., 2007; Wilson, Eilers, Heermann, & Million, 2009; Zabora, Smith, Baker, Wingard, & Curbow, 1992). Families must relocate to a transplant center for an extended period, and partners are faced with intensive caregiving responsibilities involving the provision of both instrumental and emotional support. Qualitative and quantitative research investigations reveal recurrent themes for family caregivers (CGs): uncertainty, depression, guilt, loneliness, geographic separation from friends and other family members, employment/work disruptions, role changes, fatigue, sleep and sexual problems, difficulty looking towards the future, and financial concerns associated with medical and housing costs (Bishop et al., 2007; Wilson et al., 2009; Zabora et al., 1992). Caregiving spouses of HSCT patients report elevated levels of depression and anxiety in comparison to both their patient counterparts and non-medical controls (Langer, Abrams, & Syrjala, 2003). They also report lower levels of marital satisfaction (Bishop et al., 2007; Langer, et al., 2003). Furthermore, both HSCT patients and partners engage in protective buffering (Langer, Brown, & Syrjala, 2009; Langer, Rudd, & Syrjala, 2007), a relationship-focused coping mechanism characterized by the concealment of negative illness-related thoughts and feelings from one's partner (Coyne & Smith, 1991), with CGs engaging in this behavior to a greater extent than patients (Langer, et al., 2009). In short, evidence suggests that HSCT partners *experience* negative affect but may not *express* such. Accordingly, they may benefit from structured opportunities to disclose.

Interest in the consequences of emotional expression (EE) or lack thereof is long-standing (Breuer & Freud, 1895/1966; Darwin, 1872/2006). Contemporary research on the topic has taken many forms, with perhaps the most sophisticated employing an experimental design. In the first such study (Pennebaker & Beall, 1986), undergraduates were randomly assigned either to: write about the facts surrounding a personal traumatic event, with no mention of feelings; write about their feelings surrounding a personal traumatic event, with no mention of facts; write about both the facts *and* their feelings; or control, write about trivial, innocuous topics. Participants wrote for 15 minutes on four consecutive days. Results indicated a poorer initial response among students in the "facts and feelings" group as compared to those in the other groups (higher blood pressure and more negative mood), but greater long-term *benefit* as evidenced by fewer medical visits for illness.

Similar studies followed, initially utilizing undergraduate samples (Pennebaker, Kiecolt-Glaser, & Glaser, 1988), then applied samples, such as recently unemployed engineers (Spera, Buhrfeind, & Pennebaker, 1994), psychiatric prison inmates (Richards, Beal, Seagal, & Pennebaker, 2000), bereaved persons (Bower, Kemeny, Taylor, & Fahey, 2003; Stroebe, Stroebe, & Schut, 2002), trauma survivors (Batten, Follette, Rasmussen Hall, & Palm, 2002; Koopman et al., 2005; Pennebaker, Barger, & Tiebout, 1989), HIV positive patients (Petrie, Fontanilla, Thomas, Booth, & Pennebaker, 2004), asthmatics and rheumatoid arthritics (Harris, Thoresen, Keith, & John, 2005; Smyth, Stone, Hurewitz, & Kaell, 1999), pain patients (Norman, Lumley, Dooley, & Diamond, 2004), cancer patients (De Moor, Sterner, & Hall, 2002; Gellaitry, Peters, Horne, & Bloomfield, 2010; Low, Stanton, Bower, & Gyllenhammer, 2010; Stanton et al., 2002; Zakowski, Herzer, Barrett, Milligan, & Beckman, 2010; Zakowski, Ramati, Morton, Johnson, & Flanagan, 2004), and even children (Reynolds, Brewin, & Saxton, 2000). Results have been equivocal, with some studies demonstrating beneficial effects of EE (Broderick, Junghaenel, & Schwartz, 2005; Gidron et al., 2002; Pennebaker & Francis, 1996; Pennebaker, et al., 1988; Petrie, et al., 2004; Smyth, et al., 1999; Spera, et al., 1994; Stanton, et al., 2002), some demonstrating no effect of EE (Harris, et al., 2005; Stroebe, et al., 2002), some demonstrating negative effects of EE (Batten, et al., 2002; Gidron, et al., 2002), and still others yielding no main effect of experimental condition but instead moderating effects (Koopman, et al., 2005; Low, et al., 2010; Zakowski, et al., 2004). For example, in a study of women with metastatic breast

cancer, EE was found to be more effective for those low in emotional support (Low, et al., 2010). Results from a meta-analysis of 146 experimental disclosure studies (Frattaroli, 2006) yielded an overall r -effect size of 0.08 (Cohen's $d = .15$), indicating a small but nonetheless statistically significant salutary effect of EE. Another meta-analysis synthesizing the effects of 9 clinical samples (Frisina, Borod, & Lepore, 2004) reported an effect size of $d = .19$, noting that EE was more helpful for physical than for psychological outcomes.

With few exceptions (Esterling, Antoni, Fletcher, Margulies, & Schneiderman, 1994; Harrist, Carlozzi, McGovern, & Harrist, 2007; Pennebaker, et al., 1989), experimental disclosure studies have utilized *writing* as the mode of expression. Little attention has been paid to the effects of speaking. Utilizing a 2 (mode: writing, talking) $\times$ 2 (topic: life goals, daily schedule) design, Harrist and colleagues (2007) found a main effect of topic, such that expressions about life goals were more beneficial than were expressions about daily schedule, regardless of mode. In addition, participants randomly assigned to talk rated their post-disclosure mood as less negative than those randomly assigned to write. In another study (Esterling, et al., 1994), Epstein-Barr seropositive undergraduates were randomly assigned either to talk about stressful topics, to write about stressful topics, or to write about trivial topics. Participants who talked about stressful topics evidenced lower Epstein-Barr Virus antibody titers (indicating better immune function) than did participants who wrote about stressful topics, who in turn evidenced lower levels than did those who wrote about trivial topics. This study suggests superiority for expressive talking. However, one of the meta-analyses cited previously concluded that mode did not moderate the effect of EE (Frattaroli, 2006).

Many researchers have analyzed the content of participants' expressions, finding benefit from the use of emotion and cognitive mechanism words, the latter suggestive of insight gained (Pennebaker, 1993; Pennebaker & Francis, 1996). Less consistent attention has been paid, in contrast, to experiential and physiologic indicators of emotion during or immediately following disclosure. Evidence for habituation exists, with EE participants displaying decreasing levels of negative affect and physiological arousal across sessions (Petrie, Booth, Pennebaker, Davison, & Thomas, 1995; Smyth, Hockemeyer, & Tulloch, 2008). In addition, EE has been associated with lower levels of skin conductance, whereas inhibition has been associated with higher levels of skin conductance (Pennebaker, et al., 1989; Pennebaker, Hughes, & O'Heeron, 1987). Collectively, these results suggest a "working through" process whereby insight is gained and the experiential and physiological manifestations of expression lessen over time.

The present study sought to test acceptability of an expressive talking paradigm for partners of HSCT survivors and to examine subjective, expressive, and physiologic indicators of emotion during disclosure. In line with prior EE research, hypotheses were as follows. Relative to those randomly assigned to a 3-session control condition, CGs randomly assigned to a 3-session EE condition were expected to exhibit greater negative emotional experience, greater negative emotional expression, and greater sympathetic arousal during disclosure, with the trajectory for the EE group characterized by initial elevations in negative affect and arousal but decreases across sessions. In addition, EE participants were expected to utter more words indicative of cognitive processing relative to controls (and to use more of these words over time), and to report more positive perceptions of the exercises.

METHOD

Participants

Patients and CGs were recruited from the Seattle Cancer Care Alliance (an alliance of three institutions including the Fred Hutchinson Cancer Research Center) between August 2006

and January 2009, a 2.5 year period. Patients with an imminent HSCT were screened for eligibility and, if eligible for further screening based on medical record, scheduled for a face-to-face meeting. If fully eligible and interested in participating, the CG was then approached for eligibility determination and consent. Eligible patients were at least 21 years old, English speaking and comprehending, planning to receive an allogeneic myeloablative or non-myeloablative HSCT, and married or in a committed, cohabiting, heterosexual or homosexual relationship. Eligible CGs were at least 21 years old, English speaking and comprehending, present at the transplant site, and planning to remain so for at least two months. CGs with presence or history of a neurologic disorder were excluded, as this can affect EE (Borod, 1993). All participants provided written consent.

Procedure

The study was a randomized controlled trial. Procedures were approved by the Fred Hutchinson Cancer Research Center Institutional Review Board. Participants were enrolled prior to the transplant, but not randomized until approximately 50 days post-transplant, a point in time characterized by extreme CG burden when patients are out of the hospital but still require extensive acute care. Randomization was stratified by CG gender because females are known to be more emotionally expressive than males (Kring & Gordon, 1998). A standard background form administered prior to the transplant assessed demographic characteristics. Medical records were extracted to assess clinical characteristics of patients. The first expressive talking exercise occurred just after randomization. Both conditions involved three talking sessions, each 10 minutes in length. Sessions 1-3 were targeted to take place on days 50, 53, and 56 post-transplant, respectively (each ± 7). The number (Norman, et al., 2004; Pennebaker & Francis, 1996; Smyth, et al., 1999) and spacing (Smyth, 1998) of sessions was based on published research available at the time of study design. For example, in the first meta-analysis of EE studies, spaced versus daily consecutive sessions were associated with greater effect sizes (Smyth, 1998).

Participants randomly assigned to the EE condition were given the following instructions: You will be asked, for the next 10 minutes, to talk about your deepest thoughts and feelings about your partner's transplant and your experiences as caregiver. If you find that your talking leads to other related topics, that is fine. Don't worry if you say something you'd like to change, if you say 'um' or if you stutter. It's absolutely OK. And of course, you will have natural pauses. If you run out of things to say, it's fine to go back and repeat something that you've already said. You will probably talk about it a bit differently the second time. It is critical that you let yourself go and touch those deepest emotions and thoughts that you have related to transplant and caregiving.

These instructions (and the 10-min length) were found to elicit emotional experience and expression in a previous study involving cancer CGs (Langer, et al., 2007).

CGs in the control condition spoke about their daily schedule during sessions 1 and 3, focusing on just the facts. Instructions were as follows:

Many people's schedules are disrupted or affected by transplant. I am interested in how you plan to manage your time. You will be asked, for the next 10 minutes, to talk about your plans for the *upcoming week, including today*. Talk about this topic without discussing your thoughts and feelings surrounding your plans. Instead, focus on a factual description. Just tell us your plans. Don't worry if you say something you'd like to change, if you say "um" or if you stutter. It's absolutely OK. And of course, you will have natural pauses. If you run out of things to say, it's fine to go back and repeat something that you've already said. You will probably talk about it a bit differently the second time.

While repeated sessions of this topic worked successfully in expressive writing studies (Petrie, et al., 2004; Smyth et al., 1999, 2002), we did not deem it practical to submit our highly stressed CGs to three such sessions. To retain participants, we felt it important to intersperse the two neutral talking sessions with something a bit more engaging, yet still controlling for time and attention. Accordingly, in session 2, CGs spoke about positive aspects of their life, based on a control condition used by Norman et al. (2004):

You may talk about an area of your life that is positive and not affected by your partner's transplant, a recent event that made you feel good emotionally, or a fond memory from your past. The key is to focus on pleasant thoughts and feelings. Talk about the details and facts surrounding the event, and about the good feelings you experienced. Don't worry if you say something you'd like to change, if you say "um" or if you stutter. It's absolutely OK. And of course, you will have natural pauses. If you run out of things to say, it's fine to go back and repeat something that you've already said. You will probably talk about it a bit differently the second time.

All sessions were audiorecorded. CGs spoke directly to a female experimenter who made it clear that her role was simply to operate the equipment and watch the time, and that she would not be conversing with participants. Audiorecordings were transcribed, then submitted to text analysis via the Lexical Inquiry and Word Count (LIWC) program (Pennebaker, Chung, Ireland, Gonzalez, & Booth, 2007). This program outputs data for multiple linguistic dimensions. We focused on the percentages of negative emotion, positive emotion, and cognitive mechanism words uttered. Exemplar words include "hurt", "love", and "cause", respectively.

Skin conductance was used to measure emotional arousal. Electrical conductance measured across two points of the skin varies systematically with moisture level in the skin. Sweat gland activity is entirely controlled by the sympathetic cholinergic nervous system. Since excitatory and inhibitory influences on the sympathetic cholinergic nervous system occur in brain regions involved in emotional arousal, change over time in skin conductance is commonly used as an unbiased indirect indicator of emotional arousal (Dawson, Schell, & Filion, 2000). Skin conductance (measured in microsiemens) was monitored by means of the PowerLab system, commencing 5 minutes prior to the talking exercise (i.e., baseline, when the apparatus was initially attached) and extending 5 minutes post. Subjects were fitted with finger electrodes. Signals were amplified for recognition and automatically downloaded to a laptop. Change from baseline served as the dependent measure.

Immediately following each talking exercise, CGs completed the Positive and Negative Affect Schedule (PANAS) and a process measure. The PANAS consists of two subscales, positive affect and negative affect (Watson, Clark, & Tellegen, 1988). Respondents indicate the extent to which they experienced each of 20 emotions such as "nervous" during a given time frame. The developers reported adequate validity as evidenced by appropriate associations with measures of distress, and internal consistency reliabilities ranging from .84 to .90 across multiple time referents: at this moment, today, past few days, past few weeks, past year, and "in general". For this study, CGs were instructed to consider how they felt "during the past 10 minutes, i.e., while they were talking". Internal consistencies were .91 for positive affect and .88 for negative affect. The process measure, based in part on Pennebaker, Barger, and Tiebout (1989), assessed perceptions of the talking exercises. CGs rated the helpfulness and meaningfulness of each session, and the extent to which: the disclosure was emotionally revealing, they would recommend the session to others, and they had not previously disclosed the things they said to others. Ratings were made on a 1-5 scale.

Statistical analysis

Analyses were conducted using IBM Statistical Package for the Social Sciences 18.0 and Statistical Analysis Software 8.0. Independent t-tests and chi-square tests were used to examine pre-transplant demographic characteristics as a function of post-transplant randomized condition, and to compare subgroups of eligible participants (those who consented to the study and those who refused). Generalized Estimating Equation (GEE) methods were employed to model repeated measurement of subjective, expressive, and physiologic indicators of emotion within and between talking sessions, using an exchangeable correlation assumption. GEE methods allowed the incorporation of fixed covariates (gender and experimental condition) and time-varying covariates (session and time within session) and accommodated arbitrary patterns of missing data. Dependent variables were PANAS subscale scores, skin conductance change from baseline, LIWC-derived rates of negative emotion, positive emotion, and cognitive mechanism words uttered, and items from the process measure. Finally, descriptive statistics were conducted to examine PANAS negative affect scores as a function of session, experimental condition, and “completer status” (those who completed all three talking sessions and those who did not).

RESULTS

Table 1 displays pre-transplant demographic characteristics of CGs, as well as clinical characteristics of their partners (i.e., the patients). Across randomized groups, CGs were on average 54 years old, 72% female, 4% Hispanic, 96% Caucasian, and 61% college-educated. The majority of couples were married (97%) and heterosexual (98%), and the average relationship was 22 years in length. Demographic characteristics did not differ as a function of experimental condition ($p > .05$) with one exception: CGs randomized to the control group were older than those randomized to the EE group, $p = 0.045$. With respect to clinical characteristics, the most common patient diagnosis was Acute Leukemia, followed by Myelodysplasia. In addition, 46% of transplants were non-myeloablative, involving a less intensive preparatory treatment regimen. Neither diagnosis nor preparatory regimen differed as a function of experimental condition ($p > .05$).

Figure 1 illustrates study flow from screening through intervention. Two-hundred and ninety-seven of the 490 patients assessed for eligibility did not meet inclusion criteria, and an additional 27 were unable to be fully evaluated. This resulted in 166 eligible couples, of whom 122 agreed to participate (73% agreement). The two eligible patient subgroups (the 122 eligible and enrolled versus the 44 eligible and refused) did not differ with respect to age, gender, race, or ethnicity, $p > 0.05$. Eighty-eight of the 122 enrolled couples were available and willing to continue with the study at day 50 post-transplant, and were randomized. Twenty-nine CGs were randomly assigned to the EE condition, 29 to the control condition, and 30 to a separate pilot project not described here. In the latter, CGs were asked to engage in EE but only for one session and their patient was present; the patient sat quietly off to the side and listened as the caregiver spoke. Among the 58 CGs randomly assigned to either the EE or control conditions (neither of which involved the patient), 57 completed at least one talking session, our analysis subsample. Sessions 1-3 took place on $M \pm SD$ days 52.6 ± 5.5 , 55.8 ± 5.7 , and 59.9 ± 10.8 post-transplant, respectively.

Table 2 presents results of the GEE models for subjective, physiologic, and expressive indicators of emotion. The analysis conducted on PANAS negative affect scores yielded main effects of group ($p = 0.03$) and session ($p = 0.002$), such that EE participants experienced more negative emotion during disclosure than did controls and, across groups, negative affect was highest during session 1. A main effect of session also occurred for

positive affect ($p = 0.02$); across groups, positive emotional experience was highest during session 2.

The analysis for skin conductance produced main effects of time ($p < 0.0001$) and session ($p = 0.005$), in addition to a group $\times$ session interaction ($p = 0.02$). Skin conductance increased over the course of the 10-min sessions, and was higher during sessions 2 and 3 versus 1. The top panel of Figure 2 depicts the group $\times$ session interaction. Participants in the control group were most physiologically aroused during session 2 (positive life memories) as compared to sessions 1 and 3 (daily schedule), whereas the pattern for participants in the EE group was fairly linear, increasing across sessions. The difference between the two groups was greatest during session 3.

Analyses for negative emotion and cognitive mechanism words yielded main effects of group ($p = 0.001$), such that CGs in the EE group uttered more of these words than did CGs in the control group. This effect for cognitive mechanism words was qualified by a group $\times$ session interaction ($p = 0.005$). The nature of this interaction is displayed in the bottom panel of Figure 2. The pattern was similar to that for skin conductance, in that the largest difference between the two groups occurred during session 3, with the EE group uttering more words indicative of cognitive processing at this time. The analysis for positive emotion words yielded a main effect of session ($p < 0.0001$), such that participants uttered more positive emotion words during session 2 as compared to sessions 1 and 3. This effect was qualified, however, by a group $\times$ session interaction ($p < 0.0001$). The trajectory of positive lexical expression was relatively unchanged across sessions for the EE group; in contrast, for the control group, positive lexical expression was elevated in session 2 as compared to sessions 1 and 3, to be expected given the control group instructional focus on positive life memories during session 2.

Table 3 presents results of the GEE models for the process measure, designed to assess perceptions of the talking exercises. Main effects for several of the items indicated that EE participants rated the exercises as more helpful ($p = 0.005$), meaningful ($p = 0.04$), and revealing of their emotions ($p = 0.0001$) than did control participants; they were also more likely to disclose things that they had not previously disclosed ($p < 0.0001$). Main effects of session further revealed that, across groups, sessions 2 and 3 were seen as the most helpful ($p = 0.001$), session 2 was seen as more meaningful than session 1 ($p = 0.04$), and session 2 was seen as more emotionally revealing and worth recommending than sessions 1 and 3 (p values $< .01$). These main effects were qualified, however, by group $\times$ session interactions for several of the items: helpfulness ($p = 0.05$), meaningfulness ($p = 0.005$), emotionality of disclosures ($p = 0.01$), and worth recommending to others ($p = 0.01$). For the EE group, perceptions of helpfulness increased linearly across sessions; in contrast, control participants saw session 2 (positive life memories) as the most helpful. This pattern was similar for the other outcomes. Finally, the analysis for meaningfulness yielded a main effect of gender ($p = 0.04$), such that males rated the exercises as more meaningful than did females, regardless of condition.

As noted in Figure 1, seven of the 57 CGs in our analysis sample did not complete all three talking sessions. While statistical comparison of completers and non-completers is not warranted due to the small size of the latter, we nonetheless report descriptive statistics for PANAS negative affect scores as a function of session, experimental condition, and completer status. These data are shown in Figure 3. As illustrated in the figure, the 2 EE non-completers reported more negative affect during session 1 as compared to the 26 EE completers (and the controls). A similar pattern occurred within the control group, such that the 5 non-completers reported more negative affect during the initial session than did the 24 completers, but this difference was less striking than that within the EE group.

DISCUSSION

This study sought to examine effects of an expressive talking intervention for CGs of HSCT survivors. Talking about thoughts and feelings regarding the transplant resulted in (relative to controls) increased negative emotional experience, heightened expression of negative emotion, and greater use of cognitive mechanism words. While clearly emotionally effortful, the experience was nonetheless rated by EE participants as helpful, meaningful, and revealing of their emotions, more so than controls. EE participants were also more likely to have disclosed previously undisclosed topics. Of further interest, EE participants exhibited increases in arousal as they moved from session 1 to session 2 to session 3 (counter to prediction), while simultaneously exhibiting increases in the use of cognitive mechanism words. This suggests that the elevated arousal is indicative not of inhibition or suppression but instead of sustained emotional engagement. In fact, these findings suggest that perhaps extended disclosure opportunities are required (either longer or more sessions) to achieve resolution. As noted by Smyth and Pennebaker (2008), the optimal length, timing, and spacing of EE sessions has yet to be fully elucidated. There may be something unique, moreover, in expressing thoughts and feelings about an *ongoing* stressor.

Positive EE, intended to serve as an active control, appeared to have many of the same effects as negative EE. It resulted in heightened emotional engagement, as seen in increased physiological arousal and expressivity. It was also perceived positively. This is commensurate with prior work indicating salutary effects of positive EE (Burton & King, 2009; Segal, Tucker, & Coolidge, 2009; Stanton, et al., 2002). It is certainly possible, then, that including positive EE in one of the control sessions, rather than only using neutral expression, effectively turned that session into something analogous to talking about thoughts and feelings, diluting any EE/control differences. Indeed, some CGs cried while expressing positive emotions. In some cases, these were tears of joy. In others, anecdotal feedback suggested a self-regulatory process, whereby happy memories were juxtaposed to current, presumably negative states, calling attention to the discrepancy.

Interestingly, male CGs rated the talking exercises as more meaningful than female CGs. This was a main effect of gender. In other words, both EE *and* control males found meaning in talking. Because females are generally more expressive than males (Kring & Gordon, 1998), it is possible that male CGs are less likely to talk to friends and family members about their caregiving-related experiences and that, in turn, others are less likely to elicit expression from them. The male CGs in our study thus may have found benefit simply in being the center of attention and having the opportunity to talk about their experiences, regardless of content. There was also a marginally significant main effect of gender for skin conductance; across groups, males evidenced higher levels of arousal than females. This elevation is perhaps not surprising, in that disclosure is more likely to be at odds with males' dispositional emotional style and societal norms regarding masculinity (Range & Jenkins, 2010). The fact that expressivity did not differ by gender (or gender and group interactively) suggests that males and females participated equally in the process.

In the HSCT arena, as with cancer in general, much is still to be learned about how and when to best intervene, not just with CGs but with couples as a unit. Interventions designed to minimize distress among patients and partners during HSCT are lacking. One exception is a feasibility study by Bevens and colleagues (Bevens et al., 2010). Ten couples participated in a 4-session dyadic problem-solving education intervention adapted from the Prepared Family Caregiver model focused on creativity, optimism, planning, and expert information (Houts, Nezu, Nezu, & Bucher, 1996; Loscalzo & Bucher, 1999). Session 1 took place prior to transplant; session 2, at the time of discharge; and sessions 3-4, 2 and 4 weeks post-discharge, respectively. Participants reported high satisfaction with the individual sessions,

and three positive outcomes were identified through interview data: “an opportunity to talk,” “expert information,” and “creative thinking” (Bevans et al., 2010, p. 28).

For our study, fifty days post-transplant proved to be a challenging period in which to intervene. By design, we chose to intervene at a time known to be stressful for these couples, when patients face medical sequelae and partners take on countless caregiving responsibilities. But a subset of couples withdrew from the study for these very reasons. Understandably, they were “overloaded” and “simply couldn’t handle one more thing”. In the midst of a life-threatening medical crisis, self-protection may appropriately prevail. Exploring thoughts and feelings surrounding a trauma clearly raises negative affect, at least in the short-term. CGs may inherently know when they simply do not have the emotional fortitude to “go there”. However, 88% of the CGs who tried the first talking exercise completed the subsequent two (50/57). Building from the work of Bevans et al. (2010) described above, it may be better to both recruit *and* commence intervention prior to the transplant, arming CGs with EE tools as they head into conditioning, transplant, and an extensive recovery period. A writing option, moreover, would offer flexibility to use the method during available free time. Similarly, we are intrigued with the notion of offering CGs (and HSCT patients for that matter, though to our knowledge this has not yet been tested) a “menu” of EE options: writing, typing, or talking. If, as the meta-analytic data suggest (Frattaroli, 2006), mode is truly inconsequential, why not let participants choose the mode they feel most comfortable with, likely to be in line with their dispositional emotional style? This is commensurate with work by Austenfeld and Stanton (2008) in which the greatest EE benefit was seen in cases where instructional tasks matched participants’ preferred emotional coping strategies.

Implications for clinical practice

Results from this study indicate that a structured opportunity for EE was acceptable to most CGs who tried it, as was the opportunity to focus on positive memories. Further investigation is required to fully understand the optimal dose and timing of EE for this population, as well as the intrapersonal and interpersonal consequences. Spouses/partners and other family CGs are clearly impacted by the demanding transplantation and recovery processes. Practitioners should be attuned to the burdens and emotional needs of HSCT CGs and are in the position to offer outlets for EE, from journaling to one-on-one counseling with a social worker, psychologist or pastoral care professional. Couples therapy may also be warranted for some with both personal distress and relationship communication stress, to facilitate open communication between patients and partners and the sharing of treatment-related concerns in a safe, neutral setting. Communication problems are not uncommon among persons coping with cancer and their partners (Lepore & Helgeson, 1998; Manne et al., 2006; Porter, Keefe, Hurwitz, & Faber, 2005), including couples dealing with HSCT (Langer et al., 2009). Studies involving non-cancer samples, moreover, indicate links between communication deficits and marital maladjustment, divorce, and even physical decrements such as slower wound healing and increases in blood pressure (Ewart, Taylor, Kraemer, & Agras, 1991; Gottman, 1994; Kiecolt-Glaser et al., 2005; Markman, Rhoades, Stanley, Ragan, & Whitton, 2010). Accordingly, it seems imperative to intervene to provide CGs an outlet for the emotional as well as physical demands placed on them. For couples dealing with the chronic stress of cancer treatment and recovery, benefits may well be found by drawing upon well-established strategies from the EE and behavioral marital therapy literatures, with the intent of enhancing intimacy and understanding by facilitating the mutual disclosure of illness-related thoughts and feelings.

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Figure 1.
CONSORT diagram

Figure 2. Skin conductance change from baseline (top) and cognitive mechanism words uttered (bottom) as a function of experimental condition and session

Figure 3.
PANAS negative affect scores as a function of session, experimental condition, and completer status

Table 1

Pre-transplant characteristics of the sample as a function of experimental condition

	<u>EE</u>	<u>Control</u>
N	28	29
<i><u>Caregiver demographic characteristics</u></i>		
Age, M (SD)	50.9 (10.9)	57.0 (11.8)
Gender, n (%) female	20 (71.4)	21 (72.4)
Race, n (%)		
Asian	2 (7.1)	0 (0.0)
Caucasian	26 (92.9)	29 (100.0)
Ethnicity, n (%)		
Hispanic	0 (0.0)	2 (6.9)
Non-Hispanic	28 (100.0)	26 (89.7)
Unknown	0 (0.0)	1 (3.4)
Educational status, n (%)		
High school degree	5 (17.9)	5 (17.2)
2-year college or trade	5 (17.9)	7 (24.1)
4-year college degree	9 (32.1)	8 (27.6)
Post-baccalaureate degree	9 (32.1)	9 (31.0)
Total household income, n (%)		
\$44,900	3 (10.7)	3 (10.3)
\$45,000 - \$74,900	3 (10.7)	4 (13.8)
\$75,000 - \$99,900	6 (21.4)	5 (17.2)
\$100,000+	13 (46.4)	14 (48.3)
Unknown	3 (10.7)	3 (10.3)
Marital status, n (%) married	28 (100.0)	27 (93.1)
Sexual orientation, n (%) heterosexual	28 (100.0)	28 (96.6)
Length of relationship in years, M (SD)	20.8 (13.3)	23.9 (16.3)
<i><u>Patient clinical characteristics</u></i>		
Diagnosis, n (%)		
Acute Leukemia	15 (53.6)	12 (41.4)
Myelodysplasia	9 (32.1)	7 (24.1)
Lymphoma	1 (3.6)	2 (6.9)
Chronic Lymphocytic Leukemia	1 (3.6)	2 (6.9)
Other	2 (7.1)	6 (20.7)
Preparatory regimen, n (%)		
Myeloablative	17 (60.7)	14 (48.3)
Non-myeloablative	11 (39.3)	15 (51.7)

Table 2
Results of the GEE models for subjective, physiologic, and expressive indicators of emotion

Term	Negative affect (PANAS)		Positive affect (PANAS)		Skin conductance change from baseline	
	Effect (SE)	p	Effect (SE)	p	Effect (SE)	p
Intercept	14.5 (1.0)		32.6 (1.3)		4.49 (0.95)	
Time (per 10 min)	---	---	---	---	3.12 (0.43)	<0.0001
Group						
Control	Reference		Reference		Reference	
EE	2.8 (1.2)	0.03	0.2 (1.8)	0.90	1.96 (1.19)	0.11
Session						
1	Reference ^a		Reference ^a		Reference ^a	
2	-1.7 (0.6) ^b		1.8 (0.9) ^b		2.87 (0.78) ^b	
3	-1.9 (0.5) ^b	0.002	-0.8 (0.7) ^a	0.02	2.46 (0.91) ^b	0.005
Gender						
Female	Reference		Reference		Reference	
Male	0.2 (1.5)	0.90	1.9 (1.9)	0.32	2.62 (1.31)	0.06
Cognitive mechanism words uttered						
Positive emotion words uttered						
Term	Effect (SE)	p	Effect (SE)	p	Effect (SE)	p
Intercept	0.54 (0.07)		2.83 (0.14)		19.77 (0.33)	
Group						
Control	Reference		Reference		Reference	
EE	1.11 (0.10)	<0.0001	-0.12 (0.17)	0.51	1.49 (0.41)	0.001
Session						
1	Reference		Reference ^a		Reference	
2	0.00 (0.09)		1.59 (0.26) ^b		0.37 (0.37)	
3	-0.16 (0.09)	0.06	0.25 (0.17) ^a	<0.0001	-0.17 (0.30)	0.38
Gender						
Female	Reference		Reference		Reference	
Male	-0.03 (0.13)	0.85	0.03 (0.20)	0.88	0.00 (0.35)	0.99

Note. EE = emotional expression. The following interactions were significant: group $\times$ session for skin conductance ($p = 0.02$), group $\times$ session for positive emotion words ($p < 0.0001$), and group $\times$ session for cognitive mechanism words ($p = 0.005$). For contrasts within session (following a significant main effect of session), values sharing a superscript letter were similar (not significantly different) while those not sharing a superscript letter differed at the $p < .05$ level.

Table 3

Results of the GEE models for the process items

Term	Helpful		Meaningful		Revealing of emotions		Worth recommending		Previously undisclosed	
	Effect (SE)	p	Effect (SE)	p	Effect (SE)	p	Effect (SE)	p	Effect (SE)	p
Intercept	2.55 (0.20)		3.04 (0.20)		2.56 (0.22)		3.28 (0.22)		1.54 (0.18)	
Group										
Control	Reference		Reference		Reference		Reference		Reference	
EE	0.73 (0.23)	0.005	0.53 (0.24)	0.04	1.01 (0.22)	0.0001	0.41 (0.24)	0.09	1.43 (0.22)	<0.0001
Session										
1	Reference ^a		Reference ^a		Reference ^a		Reference ^a		Reference	
2	0.65 (0.16) ^b		0.39 (0.14) ^b		0.84 (0.17) ^b		0.49 (0.14) ^b		-0.05 (0.21)	
3	0.44 (0.14) ^b	0.001	0.11 (0.14) ^{ab}	0.04	0.17 (0.13) ^a	0.0002	0.25 (0.13) ^a	0.008	-0.13 (0.22)	0.81
Gender										
Female	Reference		Reference		Reference		Reference		Reference	
Male	0.43 (0.24)	0.08	0.49 (0.22)	0.04	0.30 (0.25)	0.24	0.40 (0.22)	0.08	0.14 (0.23)	0.54

Note. EE = emotional expression. Group × session interactions were significant for helpfulness ($p = .05$), meaningfulness ($p = 0.005$), revealing of emotions ($p = 0.01$), and worth recommending ($p = 0.01$). For contrasts within session (following a significant main effect of session), values sharing a superscript letter were similar (not significantly different) while those not sharing a superscript letter differed at the $p < .05$ level.