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Using expressive writing to improve cancer caregiver and patient health: A randomized controlled feasibility trial

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ABSTRACT

Purpose: This study examined the feasibility and preliminary efficacy of Expressive Writing (EW) in improving informal cancer caregiver (IC) and patient health, and enhancing ICs' emotion regulation.

Method: Fifty-eight breast cancer ICs and patients participated in a randomized controlled feasibility trial of remote EW. ICs were randomly assigned to the EW or control group and completed 3 weekly writing sessions. ICs and patients completed health and emotion regulation assessments at baseline, intervention completion, and 3 months post-intervention. Screening, recruitment, assessment process, randomization, retention, treatment adherence, and treatment fidelity were computed for feasibility. Effect sizes were calculated using the PROMIS Depression Short Form, RAND Short Form 36 Health Survey, Breast Cancer Prevention Trial Hormonal Symptom checklist, healthcare utilization, and the Emotion Regulation Questionnaire for efficacy.

Results: Of the 232 interested individuals, 82 were screened, and 60 enrolled (6 monthly). Two individuals withdrew and 19 were lost to follow-up, leaving 39 individuals. ICs completed at least one assessment and two sessions, and patients completed at least two assessments. All sessions were administered as intended. ICs generally followed instructions (88%–100%), wrote the full time (66.7%–100%), and were engaged ($M(SD)$ = 3.00(1.29)-4.00(0.00)). EW had small-to-medium effects in improving IC health ($g = -0.27$–0.04) and small-to-large effects in improving patient health ($g = -0.28$-0.86). EW moderately decreased suppression ($g = 0.53$–0.54) and slightly increased reappraisal, at least 3 months post-intervention ($g = -0.34$-0.20).

Conclusions: Remote EW may be feasible with cancer ICs and improve cancer IC and patient health. However, it can benefit from additional retention strategies and rigorous testing.

Trial registration: CenterWatch Clinical Trials Listing Service (#TX217874); ClinicalTrials.gov (#NCT06123416).

1. Introduction

Informal caregivers (ICs) are essential in cancer care and treatment. On a daily basis, they provide emotional, financial (e.g., paying bills), and even medical (e.g., managing symptoms) support (Hunt et al., 2016). Importantly however, cancer caregiving can be emotionally and physically demanding (Family Caregiving Alliance, 2023).

Despite having a shorter duration compared to many other illnesses (i.e., two years average), cancer caregiving is usually more time-consuming and burdensome than other types of caregiving (Washington et al., 2015). Many cancer ICs also feel unprepared in their role and lack sufficient information on how to effectively care for patients (Adelman et al., 2014; Applebaum et al., 2020). Furthermore, many cancer ICs feel lonely and lack sufficient social support (Gray et al., 2020), which can further increase their caregiving burden and psychological distress (Badger et al., 2023).

Given these challenges, it may be unsurprising that many cancer ICs report poor mental (e.g., depression, Joling et al., 2010; Shaffer et al., 2017) and physical health (e.g., physical well-being, Kershaw et al., 2015; weakened immune functioning; Rohleder et al., 2009). These negative health outcomes make it imperative to address cancer ICs' needs, especially with the global increase in cancer cases and shift towards cancer care in outpatient and home settings (Ryerson et al., 2016).

The needs of cancer ICs vary from accessing more practical caregiving content (e.g., managing patient's symptoms) to determining how

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to make end-of-life decisions (Family Caregiving Alliance, 2023). Most cancer IC interventions have focused on providing ICs with practical caregiving content (e.g., Ferrell and Wittenberg, 2017; Ugalde et al., 2019). However, the greatest need reported by cancer ICs is managing their emotions effectively (Family Caregiving Alliance, 2023). As a result, there is a growing interest in psychosocial interventions that target cancer ICs' emotion regulation skills (e.g., cognitive behavioral therapy, psycho-education) to ultimately improve their health (O'Toole et al., 2017).

Some of these interventions show promising effects, such as reduced depression symptoms (Applebaum et al., 2020) and anxiety (Bahrami et al., 2020). However, meta-analyses suggest that these effects can also be difficult to obtain and to maintain in the long-run (Ferrell and Wittenberg, 2017; Northouse et al., 2010). This may be partly due to their intensive format, which often includes face-to-face visits, multiple tasks (e.g., skills training and counseling), and a significant time commitment (e.g., several times per week; Ugalde et al., 2019). Thus, there is a need to adopt psychosocial interventions for cancer ICs that are both feasible and efficacious. Notably, however, feasibility of cancer IC interventions is rarely assessed or reported (Ugalde et al., 2019). The current study focuses on Expressive Writing (EW; Pennebaker, 1997) as one cancer IC intervention that has the potential to be both feasible and efficacious. EW is a psychosocial intervention in which people write about their feelings concerning a traumatic or stressful event over brief writing sessions (Pennebaker, 1997). Before discussing its potential feasibility, we first describe the existing evidence for its efficacy.

EW is a well-established intervention with small, but robust positive effects on mental health (e.g., reduced anxiety) and physical health (e.g., improved immune functioning) across both community and clinical samples (Frattaroli, 2006). Notably, EW has also been consistently used with cancer patients (Zachariae and O'Toole, 2015). However, its benefits have been found to be more consistent for some outcomes (e.g., fatigue) relative to others (e.g., depression; Abu-Odah et al., 2024). The varying findings across outcomes for cancer patients may be partly due to differences across intervention protocols (Abu-Odah et al., 2024) or differences in patients' levels of biological impairment (Zachariae and O'Toole, 2015).

Recently, a growing number of studies have also begun to conduct EW with ICs (Riddle et al., 2016) and cancer ICs more specifically (Ghezeljeh et al., 2023; Leung et al., 2023). Many of these studies suggest that EW improves mental health in ICs (e.g., reduced stress; Duncan et al., 2007; reduced depression (Harvey et al., 2018), reduced anxiety; Zhang et al., 2023). Interestingly, one study even tested whether EW with cancer ICs can indirectly benefit patient mental health, but found no effect (Arden-Close et al., 2013). However, in this study, EW was delivered to both ICs and patients. Thus, while there is initial evidence for EW's benefits in ICs, at least in terms of mental health, little research has tested whether EW in ICs alone may affect patient health. Moreover, it is unknown whether EW in ICs may improve the physical health of ICs or patients. This is important for determining the range of health outcomes that EW in ICs may affect.

EW may be considered an emotion regulation intervention because it is believed to improve health by targeting emotion regulation. In particular, theories propose that EW increases the use of a strategy called *cognitive reappraisal* (i.e., changing how one construes the meaning of emotional situations) and decreases the use of a strategy called *expressive suppression* (i.e., inhibiting emotional expression; Gross, 1998). In support of increased reappraisal, the cognitive-processing theory proposes that writing about one's thoughts and feelings increases positive framing of situations (Lepore and Smyth, 2002). In support of decreased suppression, the social integration model proposes that writing about one's thoughts and feelings motivates the sharing of emotions (Pennebaker and Graybeal, 2001). Some evidence for these theories comes from a study which found that EW increased reappraisal and decreased suppression in recently discharged psychiatric patients (Suhr et al., 2017). Directly related to cancer ICs, Arden-Close et al. (2013) found that written emotional disclosure reduced ovarian cancer ICs' intrusive thoughts, which may facilitate reappraisal. However, no study has directly tested EW's effects on the emotion regulation of cancer ICs. This knowledge is important for determining why EW may have potential health benefits.

Given EW's health benefits (e.g., Frattaroli, 2006) and the growing evidence of its efficacy in cancer ICs (e.g., Ghezeljeh et al., 2023), it may be an ideal candidate for feasibility testing with cancer ICs. Leon et al. (2011) proposes seven criteria for assessing the feasibility of interventions: *screening* (i.e., number of participants screened each month), *recruitment* (i.e., number of participants enrolled each month), *randomization* (i.e., proportion of eligible screened individuals who enroll), *assessment process* (i.e., proportion of completed assessments), *retention* (i.e., retention rates of each treatment group), *treatment adherence* (i.e., participants' adherence to intervention protocol), and *treatment fidelity* (i.e., rate of intervention components monitored by the study team).

EW has several features that give it the potential to be feasible. One particularly advantageous feature of EW is its flexible format; it can be self-guided and done online (van Middendorp et al., 2007). This increases accessibility to ICs by not limiting them to a particular geographic location or requiring them to commute. Notably, this may also make it easier for researchers to screen, recruit, and randomize (i.e., enroll screened individuals) participants. Furthermore, there are fewer costs associated with monitoring the intervention, which may increase treatment fidelity and lessen the burden on healthcare settings. In addition to its flexible format, EW does not require a large time commitment (e.g., 15–20 min per writing session) from participants, which may optimize retention. EW also has only one component (i.e., writing) with clear instructions, which may increase treatment adherence. Moreover, the components of EW are typically administered only 3–5 times and are spread out over days or weeks (Pennebaker and Graybeal, 2001). This relatively low frequency of sessions minimizes the frequency of assessments needed to test its efficacy. Despite these many advantageous features of EW however, no study has directly examined EW's feasibility with cancer ICs. Furthermore, only one study has conducted a remote version of EW with cancer ICs (Arden-Close et al., 2013), which may be an especially feasible format to implement.

Within the general population, remote EW has been found to be quite feasible, with most participants staying in the study after enrollment and consistently adhering to intervention protocol (e.g., Glass et al., 2019). Furthermore, similar to face-to-face EW, remote EW has also been found to improve mental health (e.g., decreased depression symptoms and stress) in community (e.g., Vukčević Marković et al., 2020; Bechard et al., 2021) and clinical samples (i.e., patients with mood disorders; Baikie et al., 2012). Most relevant to our focus on ICs, one study found that remote EW with breast cancer patients improved mental health and physical health (e.g., decreased depression symptoms and physical symptom severity; Henry et al., 2010). Meanwhile, Arden-Close et al. (2013) did not find effects of EW on cancer IC health but this may be partly because they used highly specific instructions. Thus, taken together, there is at least some evidence that remote EW is feasible and as efficacious as face-to-face EW.

The primary aim of the current study was to determine the feasibility of remote EW with cancer ICs. Following Leon et al. 's (2011) feasibility criteria, the primary outcomes were screening, recruitment, randomization, assessment process, retention, treatment adherence, and treatment fidelity. The secondary aim was to explore EW's preliminary efficacy in (a) simultaneously improving IC and patient health, and (b) changing IC emotion regulation. The secondary health outcomes were depression, mental health, and physical health in both ICs and patients, as well as breast cancer symptoms and healthcare utilization in patients. The secondary emotion regulation outcomes were suppression and reappraisal in ICs. Given that this was a feasibility study, hypothesis testing with inferential statistics could not be conducted. However, mean-level differences in health and emotion regulation outcomes based on treatment group are reported. As an initial investigation, we focused on breast cancer patients and their caregivers to limit variability in cancer experiences and because breast cancer is the most common cancer (Ryerson et al., 2016). Given that the effects of EW on caregiver health outcomes are relatively similar across caregivers of different cancer types (Leung et al., 2023), however, we did not have unique predictions for our sample.

2. Methods

Study materials, de-identified data, and analysis scripts are available on the Open Science Framework: https://osf.io/pnmb8/?view_only=98bc69a93be8468290b9ed06202fabe9. We describe how we determined our sample size, exclusion criteria, and all measures.

2.1. Design and sample

This intervention study used a 2-group randomized controlled trial. Thus, this paper follows the relevant EQUATOR guidelines for randomized controlled trials (CONSORT). Convenience sampling was the chosen sampling technique to facilitate recruitment, which is a key aspect of feasibility. The study focused on American cancer ICs and patients. Participants were recruited from several avenues, including online medical and cancer support networks (Army of Women, Cancer Support Community, Cancer Care Support Program, Medivizor, Rare Patient Voices LLC, Survey Healthcare), research platforms (FindParticipants, ResearchMatch), Facebook advertisements, and the Stanford Cancer Institute. The study was also registered with CenterWatch Clinical Trials Listing Service and ClinicalTrials.gov. Potential participants were phone-screened.

Eligibility criteria for patients were as follows: (i) 21 years or older, (ii) English-speaking, (iii) having internet and computer access, (iv) having a breast cancer diagnosis, and having a Stage I-III (non-metastatic) cancer diagnosis. Eligibility criteria for ICs were as follows: (i) 21 years or older, (ii) English-speaking, (iii) having internet and computer access, and (iv) being the patients' primary IC. One initial eligibility criteria from patients was removed to facilitate recruitment: a Stage I-III cancer diagnosis.

Recruitment occurred from November 2018–July 2019 and follow-up occurred from February 2019–October 2019. The trial ended because data collection was scheduled for approximately 12 months. Following recommendations for feasibility studies (Leon et al., 2011), sample size was not determined through power analyses. It is unclear how successful recruitment will be in a feasibility study. Moreover, it is expected that the sample size will be small and not sufficiently powered for conducting hypothesis testing. Therefore, sample size was determined based on participant availability. The study was approved by the Institutional Review Board at Stanford University (Approval #47800) and conducted in accordance with the Helsinki Declaration. A sample of 60 breast cancer ICs ($n = 30$) and the patients they care for ($n = 30$) gave informed consent and enrolled in the study.

2.2. Procedure

2.2.1. Randomization and blinding

ICs were assigned to one of two groups: the EW or control group. For data analytic purposes (i.e., observing effects of IC group on patient health), patients were automatically assigned to the same group as their IC. Thus, all individuals were assigned to a group. Block randomization with block sizes of 2 were used to distribute individuals across groups as equally as possible. The final randomization was placed on a list that matched subject ID to group assignment. The study team used this list to enroll participants in the appropriate arm on the survey application REDCap. Thus, the study team was not blind to group assignment, but participants were. Although ICs received specific intervention instructions based on their group assignment, neither they nor the patients were explicitly told that there were multiple groups with different instructions.

2.2.2. Treatment conditions

The intervention followed standard EW procedures. Writing prompts were adopted from prior studies (Frattaroli, 2006; Riddle et al., 2016). Although EW studies vary in their writing prompts, we chose to use the standard open-ended, unstructured instructions for EW. We did this to increase the likelihood of detecting health benefits of EW. Furthermore, we avoided using specific, guided instructions because of a study which used these instructions and found no benefits in cancer ICs (e.g., Arden-Close et al., 2013). In the open-ended instructions, the EW group writes about an emotionally difficult event, while controls write about past events and future plans; see Supplementary Material (SM) for each group's exact instructions.

We chose to conduct three writing sessions for 20-min each in light of a meta-analysis showing that EW is more effective in improving psychological health when it is administered for at least three sessions and at least 15-min (Frattaroli, 2006). The average EW writing session is also 20-min (Frattaroli, 2006). Although EW studies vary in terms of whether they occur on a daily versus weekly basis (Frattaroli, 2006), we chose to conduct each writing session one week apart. We did this in order to minimize IC burden and to allow for more time between assessments of health and emotion regulation. Notably, the efficacy of EW for mental health does not differ when conducted on a daily versus weekly basis (Frattaroli, 2006).

2.2.3. Data collection procedures

Writing sessions were recorded on REDCap. ICs received an automated email reminder before each session and completed the sessions remotely. They were asked to complete sessions on the assigned day at a consistent time of their choice, write in a quiet location, not perform other tasks, and write for the full time (using a timer embedded in the online session). Following each session, ICs reported on adherence to session protocols.

Health (i.e., depression, mental health, physical health, breast cancer symptoms, healthcare utilization) and emotion regulation (i.e., reappraisal, suppression) were assessed in cancer ICs and patients at baseline (T0), intervention completion (T1), and 3 months later (T2). All assessments used self-reported measures because the study was remote. ICs and patients completed the same measures, except that patients additionally reported on their breast cancer symptoms and healthcare utilization. Although the focus was on IC emotion regulation, patient emotion regulation was also assessed for exploratory purposes. Measures were slightly modified from their original scales to assess outcomes in the past two weeks to better detect recent changes. Participants completed the T0 assessment upon study enrollment. One week later, ICs began the intervention. ICs and patients received the T1 assessment three weeks upon intervention completion and the T2 assessment three months later.

2.3. Feasibility outcome measures

The seven feasibility criteria from Leon et al. (2011) were assessed. *Screening* was assessed using the number of screened participants per month as well as the proportion of screened participants relative to those who expressed interest (e.g., filled out a contact form on the study website or emailed the study team with a desire to participate). *Recruitment* was assessed using the number of participants who enrolled per month. *Randomization* was assessed using the proportion of enrolled participants relative to those screened. *Assessment process* was assessed using the proportion and number of assessments completed. *Retention* was assessed using proportion and number of writing sessions completed by ICs for each treatment group. *Treatment adherence* was assessed using the proportion of ICs who followed instructions in each writing session, the average engagement level in each writing session, and the proportion of ICs who wrote for the full time in each writing session. The study team coded for whether ICs followed instructions (yes or no); the EW group should have primarily written about an emotionally difficult event, whereas controls should have primarily written about non-emotional past events or future plans. ICs self-reported their engagement (1 item; "How engaged were you in writing (not browsing the internet, watching TV, listening to music, etc.)? " 1 = *not at all engaged;* 4 = *fully engaged*) and whether they wrote for the full time (1 item; "Did you write for the full 20 min? " yes or no). *Treatment fidelity* was assessed using the number of writing sessions successfully sent online to ICs as intended (i.e., on the correct date, at the correct time).

2.4. *Intervention outcome measures*

2.4.1. *Health*

Depression was assessed using the reliable and valid 4-item PROMIS Depression Short Form (e.g., "I felt hopeless; " Cella et al., 2019), which was rated on a 4-point scale (1 = *never*; 4 = *always*). The RAND Short Form 36 Health Survey (RAND SF-36; Ware Jr and Sherbourne, 1992) was used to assess general mental and physical health. It is reliable, valid, and the most widely used self-report health measure. The mental health composite consists of 14 items on emotional well-being, energy/fatigue, social functioning, and role limitations due to emotional problems. The physical health composite consists of 21 items related to physical functioning, health perceptions, bodily pain, and role limitations resulting from physical health problems. The sub-scales within each composite can be averaged or examined independently. Two sub-scales had relatively low and inconsistent internal reliabilities across assessments (limitations resulting from emotional problems [3 items] and physical health problems [4 items]). Thus, they were excluded from the mental and physical health composites, respectively. Breast cancer symptoms (e.g., vaginal problems, musculoskeletal pain) were assessed with the 18-item Breast Cancer Prevention Trial Hormonal Symptom checklist (Terhorst et al., 2011); this is a valid and reliable scale. The total symptom number was calculated. Following Bourbeau et al.'s (2003) assessment of healthcare utilization, four common healthcare utilization indices were assessed and summed: number of physician visits (cancer/non-cancer-related), hospital admissions, hospital night stays, and emergency room visits.

2.4.2. *Emotion regulation*

Reappraisal and suppression were assessed using the Emotion Regulation Questionnaire (Gross and John, 2003), which is valid, reliable, and the most widely used emotion regulation measure. It consists of reappraisal (6 items; e.g., "When I'm faced with a stressful situation, I make myself think about it in a way that helps me stay calm") and suppression (4 items; e.g., "I keep my emotions to myself") subscales that are rated on a 7-point scale (1 = *strongly disagree*; 7 = *strongly agree*).

Table S1 in the Supplementary Material shows the internal reliabilities for all intervention outcome measures by assessment.

2.5. *Data analysis*

Statistical analyses were conducted in IBM SPSS (Version 29). Descriptive statistics were used to summarize demographic characteristics for ICs and patients, and caregiving characteristics for ICs. Percentages were calculated for categorical variables (e.g., race/ethnicity), whereas means and standard deviations were calculated for continuous variables (e.g., age). Descriptive statistics were also used to examine the primary aim of EW's feasibility by summarizing each feasibility outcome. Percentages were calculated for proportion-based outcomes (e.g., screening), whereas means and standard deviations were calculated for numerical outcomes (e.g., number of sessions completed).

Descriptive analyses were also used to explore the secondary aim of EW's preliminary efficacy on (a) improving IC and patient health, and (b) IC emotion regulation. Each health and emotion regulation outcome was summarized using means and standard deviations. T0 (i.e., baseline) outcomes were collapsed across all ICs (or all patients), whereas T1 and T2 (i.e., intervention completion and follow-up) outcomes were summarized by treatment group. Summarized outcomes for patients were based on their ICs' group membership. Given the small sample size, no significance testing was conducted. However, effect sizes were calculated using Hedge's g to determine the preliminary direction of EW's effects. Hedge's g represents the standardized mean difference between two populations similar to Cohen's d. However, unlike Cohen's d, it corrects for small-sample bias (Taylor and Alanazi, 2023). In this study, a positive effect represents a greater value for the control group over the EW group, whereas a negative effect represents a lesser value for the control group than the EW group. The magnitude of Hedge's g is identical to Cohen's d (small effect = 0.20; medium effect = 0.50; large effect = 0.80).

3. Results

3.1. *EW's feasibility*

The study flow of participants is shown in Fig. 1.

3.1.1. *Screening*

Of the 232 interested individuals, 82 (35.34%) could be reached for phone-screening. Thus, approximately one-third of interested individuals were phone-screened. An average of 9 individuals were phone-screened each month.

3.1.2. *Recruitment*

An average of 6 individuals (*n* = 3 ICs, n = 3 patients) enrolled per month.

3.1.3. *Randomization*

Of the 82 phone-screened individuals, 60 (73.17%; *n* = 30 ICs, *n* = 30 patients) enrolled in the study. The 22 individuals who did not enroll requested additional time, but did not initiate or respond to follow-ups. Thus, most individuals who were phone-screened enrolled in the study.

3.1.4. *Assessment process*

Two individuals (*n* = 1 IC, *n* = 1 patient) withdrew (0.03%) because the IC was no longer interested in participating. This left a sample of 58 individuals (*n* = 29 ICs, *n* = 29 patients). The participants were randomly assigned to the EW (*n* = 26) or control (*n* = 32) groups. However, 19 of the 58 participants (32.80%; *n* = 12 ICs, *n* = 7 patients) were excluded from the analyses because they did not complete any assessments. These individuals did not provide reasons and could not be reached. This left a final sample of 39 individuals for the analyses, which consisted of 17 ICs (*n* = 8 EW; *n* = 9 control) and 22 patients (*n* = 9 EW; *n* = 13 control). Thus, nearly one third of the participants who enrolled in the study did not complete a single assessment. From the 39 individuals who completed at least one assessment, all individuals (100%) completed the T0 assessment, 25 individuals (64.10%; *n* = 8 ICs (47.05%), *n* = 17 patients (77.27%)) completed the T1 assessment, and 22 individuals (56.41%; *n* = 7 ICs (41.17%), *n* = 15 patients(68.18%)) completed the T2 assessment. Thus, assessment completion was highest in the beginning of the study. Most ICs completed at least one assessment (control:*M(SD)* = 2.00(1.00), EW:*M(SD)* = 1.75(1.03)), while most patients completed at least two assessments (*M(SD)* = 2.45(85)).

The demographic and caregiving characteristics of the 39 participants in the final sample are in Table 1. ICs were between 43 and 77 years, while patients were between 41 and 79 years. The mean age of ICs was 57.80 years (*SD* = 11.11) and the mean age of patients was 59.36 years (*SD* = 10.66). Slightly less than half of the ICs were female (46.60%), whereas in line with the eligibility criteria, all patients were female (100%). Most ICs (88.90%) and patients (95.50%) were Caucasian/European-American. Approximately half of the ICs (58.80%)

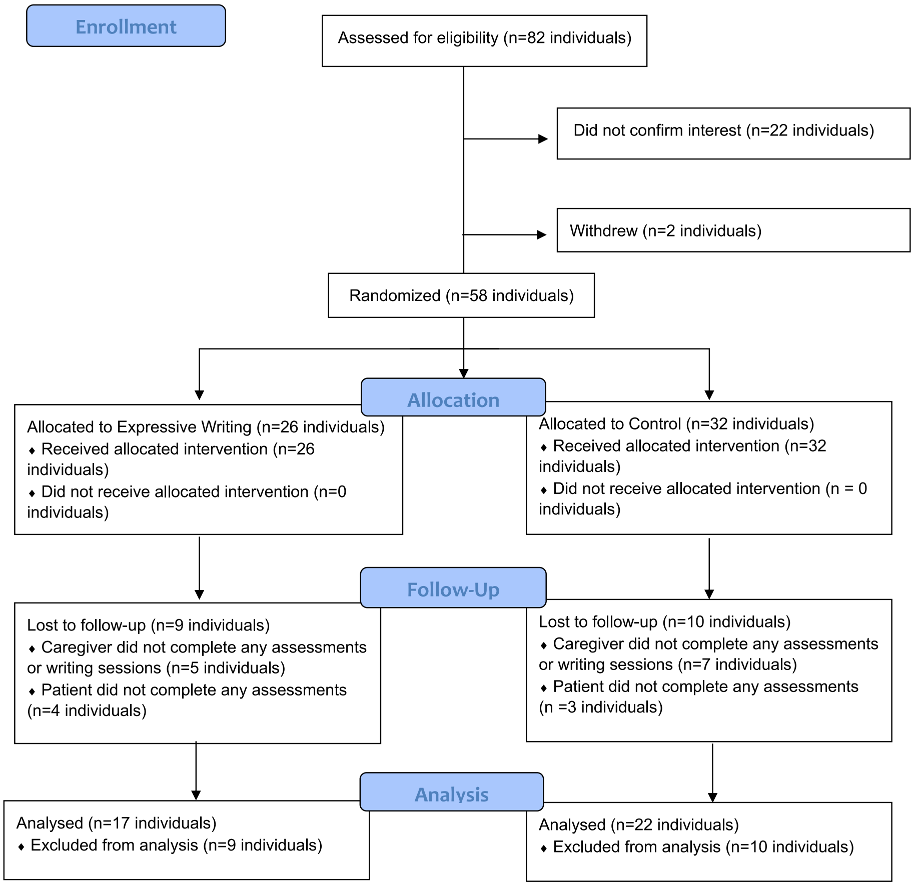

Fig. 1. CONSORT flow diagram.

and patients (40.90%) were middle income, while almost one-third of ICs (29.40%) and patients (31.80%) were upper middle income. A little over one-third of ICs (35.30%) and patients (30.40%) had some college or technical school attendance as their highest level of education. Approximately one-fifth of ICs (23.50%) and patients (30.40%) had a 4-year college degree, and approximately one-fourth of ICs (23.50%) and patients (21.70%) had a Master's degree. Most ICs (82.40%) and patients (95.70%) did not have children younger than 18 years. Most patients had Stage I (23.50%) or Stage IV (23.50%) cancer, or were unsure of what stage they had (23.50%). Most patients had received treatment, with surgery (72.20%) and chemotherapy (66.70%) being the most common forms of treatment. A little over half of ICs were the patient's romantic partner (58.80%). The next substantial portion of ICs were the patient's son or daughter (17.60%). Over half of ICs reported living with the patient (68.80%) and spending an average of 29.59 months (SD = 39.31) caregiving.

3.1.5. *Retention*

All 17 ICs from the final sample completed session 1, 6 ICs (35.29%) did not complete session 2 (control: 22.20%; EW:50%), and 8 ICs (47.05%) did not complete session 3 (control:33.30%; EW:62.5%). Thus, retention was highest at the beginning of the intervention. Meanwhile, most ICs completed an average of two sessions (control:$M(SD)$ = 2.44 (0.88); EW:$M(SD)$ = 1.87(0.99)), and thus, most of the sessions.

3.1.6. *Treatment adherence*

ICs generally followed instructions across session 1 (control:88%; EW:100%), session 2 (control:100%; EW:100%) and session 3 (control:100%; EW:100%). Engagement levels ranged from very engaged to fully engaged across session 1 (control:$M(SD)$ = 3.67(1.00); EW:$M(SD)$ = 3.00(1.29), session 2 (control:$M(SD)$ = 3.43(1.13); EW:$M(SD)$ = 3.75 (0.50), and session 3 (control:$M(SD)$ = 3.17(1.16); EW:$M(SD)$ = 4.00 (0.00)). Furthermore, more than half of ICs wrote for the full time in session 1 (control:66.7%; EW:85.70%), session 2 (control:71.4%, EW:75%), and session 3(control:100%; EW:100%). Thus, most ICs followed instructions, were relatively engaged, and wrote for the full time.

3.1.7. *Treatment fidelity*

The study team administered all writing sessions as intended (even to the ICs who were later excluded). Specifically, all writing sessions were successfully administered via email to ICs on the scheduled date at the scheduled time. Thus, the study team was able to successfully administer the intervention in a reliable manner. There were also no harms or unintended effects in any group.

3.2. *EW's preliminary efficacy*

Table 2 shows the descriptive statistics for health and emotion regulation outcomes at each assessment, for ICs and patients as well as by treatment group. It also indicates the number of participants who provided data at each assessment and were thus, included in the descriptives.

3.2.1. *IC health*

At T1, ICs in the EW group had fewer depressive symptoms than the control group ($g = 0.10$); this was a small effect. ICs in the EW group also had better mental health ($g = -0.25$); this was a small-to-medium effect. There was relatively no difference between the control and EW groups in physical health ($g = 0.04$). At T2, the EW group continued to have slightly better mental health than the control group ($g = -0.11$). Furthermore, there was still relatively no difference between groups in physical health ($g = -0.04$). However, ICs in the EW group now reported

Table 1
Demographic and caregiving characteristics (N = 39).

	IC (*n* = 17)	Patient (*n* = 22)
Age,*M*(*SD*),range(years)	57.80(11.11), 43-77	59.36(10.66), 41-79
Gender(% female)	46.60	100
Race,%		
African-American/Black	0	4.30
American Indian/Alaska Native	5.60	0
Asian/Asian-American/Pacific Islander	0	4.30
Caucasian/European-American	88.90	95.57
Income,%		
Lower income	11.80	9.10
Lower middle income	0	13.60
Middle income	58.80	40.90
Upper middle income	29.40	31.80
Upper income	0	4.50
Education,%		
8th grade or less	0	4.30
High school graduate	11.80	8.70
Some college or technical school	35.30	30.40
4-year college degree	23.50	30.40
Master's degree	23.50	21.70
Other professional degree	5.90	4.30
Children younger than 18,%		
None	82.40	95.70
One child	5.90	4.30
Two children	11.80	0
Cancer stage,%		
Stage I		23.50
Stage II		17.60
Stage III		11.80
Stage IV		23.50
Unsure		23.50
Treatment,%		
None		0
Chemotherapy		66.70
Radiation		55.60
Surgery		72.20
Other		22.20
Relationship to patient,%		
Romantic partner	58.80	
Son/daughter	17.60	
Parent/sibling	5.90	
Friend	11.80	
Other	5.90	
Living with patient,%	68.80	
Time caring for patient,*M*(*SD*) (months)	29.59(39.31)	

greater depressive symptoms than controls ($g = -0.27$).

3.2.2. *Patient health*

At T1, patients of ICs in the EW group reported fewer depressive symptoms than patients of ICs in the control group ($g = 0.54$); this was a medium effect. Patients of ICs in the EW group also reported better mental health ($g = -0.28$) and physical health ($g = -0.17$) than patients of ICs in the control group; these were small effects. Meanwhile, patients of ICs in the EW group reported fewer breast cancer symptoms than patients of ICs in the control group ($g = 0.86$); this effect was large. Patients of ICs in the EW group also reported less healthcare utilization ($g = 0.46$); this was a medium effect. At T2, patients of EW ICs continued to report fewer depressive symptoms ($g = 0.12$) and breast cancer symptoms ($g = 0.19$); however, these effects were now small. Patients of EW ICs also continued to report less healthcare utilization ($g = 0.44$); the effect remained medium. However, there was now relatively no difference in the mental health of patients of ICs in the control group versus the EW group ($g = 0.08$). Meanwhile, physical health was now slightly lower in patients of EW ICs instead of higher, than patients of control ICs ($g = 0.15$); this was a small effect.

3.2.3. *IC emotion regulation*

At T1, ICs in the EW group reported lower reappraisal than ICs in the control group ($g = 0.20$); this was a small effect. ICs in the EW group also reported lower suppression than control ICs (g=.53); this was a medium effect. At T2, ICs in the EW group continued to report lower suppression than controls ($g = 0.57$). However, ICs in the EW group now reported higher, rather than lower reappraisal compared to controls ($g = -0.34$); this was a small-to-medium effect.

4. Discussion

One of cancer ICs' greatest needs is managing their emotions more effectively (Family Caregiving Alliance, 2023). However, many psychosocial interventions designed to address this need are time and resource intensive (Ferrell and Wittenberg, 2017; Ugalde et al., 2019). To address this issue, this study investigated the potential feasibility of EW (Pennebaker and Graybeal, 2001), a well-established intervention that is growing in its use with cancer ICs (Ghezeljeh et al., 2023; Leung et al., 2023). This study also built on prior work on EW with cancer ICs by exploring its preliminary efficacy in simultaneously improving IC and patient health, and enhancing cancer IC emotion regulation.

To examine EW's feasibility, the current study assessed seven different feasibility outcomes (Leon et al., 2011). Thus far, there is little standardization in terms of what levels constitute low or high feasibility. However, to interpret our findings, we compare our feasibility results to those found in prior cancer IC interventions where possible. During the initial stages of the study, approximately one-third of the interested participants were screened and enrolled each month. This screening rate is comparable to, if not slightly higher, than other psychosocial interventions with cancer ICs, which is around one-fifth (Nelson et al., 2019). Meanwhile, most cancer IC intervention studies do not report on the frequency with which participants were recruited. Thus, it is difficult to determine whether our recruitment rate was high or low. Nonetheless, we loosened some of our prior eligibility criteria to ease recruitment. This differs from most cancer IC interventions, where most of the screened individuals are already eligible (Ugalde et al., 2019).

Once people were screened, nearly three-fourth of them enrolled in our study. This randomization rate is higher than the average randomization rate for cancer IC interventions, which is approximately one-third (Ugalde et al., 2019). It also exceeds the wide range of randomization rates for remote cancer IC interventions, which is 20%–66% (Heynsbergh et al., 2018). However, following study enrollment, at least one-third of the participants did not complete a single assessment. This differs from research showing that most cancer ICs begin an intervention study once they are enrolled (Ugalde et al., 2019). Thus, initial attrition in our study may be relatively higher than prior cancer IC intervention studies. Given that these individuals did not formally withdraw and could not be reached, it is difficult to know why they did not complete any assessments. One possible explanation could be because the study required the participation of both ICs and patients. Interventions involving cancer IC-patient dyads are particularly susceptible to attrition (Chen et al., 2023; Ketcher et al., 2021; Song et al., 2021). At the same time, the lack of participation might also be due to other factors, such as the intervention itself (e.g., time commitment).

Despite the relatively lower retention at the beginning of the study, at least half of the sample completed each assessment. As may be expected however, fewer participants completed each assessment as the study went on. Furthermore, most ICs completed most of their writing sessions. Uglade et al. (2019) found that in at least half of cancer IC interventions, cancer ICs complete all intervention components. Therefore, our retention rate may be similar to that of the average cancer IC intervention. At the same time, attrition can be as low as 14% and as high as 77% in remote interventions for cancer ICs (Heynsbergh et al., 2018). Thus, compared to other remote cancer IC interventions, remote EW may actually have higher retention. Meanwhile, most ICs followed their intervention instructions almost all of the time, were highly

Table 2
Means, standard deviations, and effect sizes of intervention outcomes.

Intervention outcomes			IC						Patient					
	T0		T1			T2			T1			T2		
	IC (n = 17)	Patient (n = 22)	Control (n = 5)	EW (n = 3)		Control (n = 4)	EW (n = 3)		Control (n = 8)	EW (n = 9)		Control (n = 8)	EW (n = 8)	
	M(SD)	*M(SD)*	*M(SD)*	*M(SD)*	*g*	*M(SD)*	*M(SD)*	*g*	*M(SD)*	*M(SD)*	*g*	*M(SD)*	*M(SD)*	*g*
Health														
Depression	5.70 (2.80)	6.50 (2.77)	6.80 (4.32)	6.33 (3.21)	0.10	6.00 (2.82)	7.66 (7.23)	−0.27	7.62 (3.37)	5.88 (2.71)	0.54	8.00 (5.12)	7.50 (2.26)	0.12
Mental health	74.04 (19.67)	65.71 (15.98)	71.76 (18.61)	76.88 (15.89)	−0.25	73.51 (15.19)	75.72 (18.62)	−0.11	60.41 (19.06)	66.05 (18.51)	−0.28	62.88 (19.42)	61.22 (19.58)	0.08
Physical health	83.77 (14.86)	60.34 (20.47)	83 (23.04)	81.94 (11.31)	0.04	86.25 (20.01)	87.22 (12.50)	−0.04	59.27 (27.34)	63.33 (18.08)	−0.17	56.80 (28.80)	53.02 (16.80)	0.15
Cancer symptoms	–	6.22 (3.46)	–	–	–	–	–	–	9.00 (4.24)	5.55 (3.35)	0.86	6.87 (4.38)	6.12 (2.74)	0.19
Healthcare utilization	–	7.27 (19.87)	–	–	–	–	–	–	7.75 (20.32)	0.88 (1.16)	0.46	5.42 (8.82)	2.37 (3.15)	0.44
Emotion regulation														
Reappraisal	5.35 (0.75)	5.37 (0.91)	5.43 (0.32)	5.33 (0.57)	0.20	5.62 (0.67)	5.94 (0.91)	−0.34	5.37 (0.68)	5.62 (0.67)	−0.35	4.85 (1.12)	5.31 (0.93)	−0.41
Suppression	4.01 (1.16)	3.09 (1.37)	4.10 (0.92)	3.33 (1.70)	0.53	4.81 (0.62)	3.91 (1.90)	0.57	3.06 (1.35)	2.55 (1.53)	0.33	3.12 (1.12)	3.18 (1.23)	−0.05

Note. IC = informal cancer caregiver; EW = Expressive Writing group; T0 = baseline; T1 = intervention completion; T2 = 3-month follow-up; n = number of participants who completed the assessment; *M(SD)* = means with standard deviations in parentheses; g = Hedge's g. Values for patients are based on their IC's treatment group.

engaged, and wrote for the full duration across all writing sessions. This suggests that treatment adherence was relatively high. The study team also reliably administered all parts of the intervention at the scheduled date and time. This treatment fidelity rate is similar to that of other cancer IC interventions, where over half of cancer IC interventions are administered as intended (Ugalde et al., 2019).

The overall feasibility findings suggest that remote EW is promising when compared to other cancer IC interventions, while offering additional convenience to ICs (e.g., completing the intervention from home). At the same time, some aspects of remote EW may make it more feasible than others. The greatest challenge appears to be in getting cancer ICs to commence the study. The study team maintained its own dedicated phone line, website, and email to facilitate communication with participants. However, to ease the burden on participants, communication was no longer required after study enrollment. Perhaps it may be useful for the study team to initiate more regular communication to minimize attrition. Nevertheless, as with other psychosocial interventions (Song et al., 2021), remote EW may still benefit from additional recruitment strategies. For instance, interested participants could contact the study team directly. Interested individuals had the option of submitting a contact form with their availability and then waiting for the team to contact them. However, it was often difficult for the study team to reach most participants who used this method. A second way to improve recruitment may be to also diversify recruitment strategies. The current study used online sources, such as support groups and medical networks, to reach a wide audience. However, many cancer ICs might have already been participating in interventions, had access to emotion regulation resources, or were not interested in joining these networks. Therefore, it will be important for future studies to also use offline recruitment sources. For instance, study flyers could be posted in hospitals and clinics and provided by nurses and oncologists.

While its primary focus was on EW's feasibility, this study also explored EW's preliminary efficacy. The observed mean-level differences suggest that ICs in the EW group had relatively better health than ICs in the control group across multiple outcomes, particularly right after the intervention. These findings are highly consistent with prior EW studies conducted with cancer ICs (Duncan et al., 2007; Harvey et al., 2018; Zhang et al., 2023). Building on these studies however, we found initial evidence that remote EW may be just as effective as face-to-face EW for cancer ICs. Furthermore, the results indicated benefits of EW for physical health (at least when self-reported), and not just mental health. Thus, EW within cancer ICs may influence a broad range of health outcomes.

Notably, the findings also indicated that patients of ICs in the EW group had relatively better mental health and physical health than patients of ICs in the control group. Thus, for the first time, these findings suggest that EW with cancer ICs may not only benefit ICs, but also patients. These findings correspond with research showing that cancer ICs' well-being can also affect patients' well-being (Litzelman et al., 2016; Thompson et al., 2021). Given that the effects of EW were typically larger for patients than effects for the caregivers themselves, caregivers' well-being may have an even greater effect on patients than previously thought. At the same time, our results have important practical implications. In particular, there may be a way to benefit patients without adding an additional burden of part-taking in an intervention.

Finally, we also examined the extent to which EW can impact emotion regulation as this may explain EW's potential health benefits. ICs in the EW group had consistently lower suppression than controls, immediately post-intervention and three months later. Interestingly, they initially had lower reappraisal than controls, but then had higher reappraisal three months later. These findings provide some initial support for theories (Lepore and Smyth, 2002; Pennebaker and Graybeal, 2001) proposing that EW improves health by enhancing people's emotion regulation. In this case, EW may decrease ICs' suppression and increase their reappraisal. The finding regarding reappraisal three months post-intervention also aligns with Arden-Close et al. (2013), which found that EW reduced intrusive thoughts in cancer ICs.

Taken together, the findings regarding EW's preliminary efficacy in simultaneously improving IC and patient health, and enhancing IC emotion regulation are promising. However, we recognize that they are still preliminary and based on a small sample size and observed mean-level differences. Thus, it is necessary to conduct significance testing in a large sample to be able to draw sufficient conclusions regarding EW's efficacy.

4.1. Limitations

This study has some important limitations. First, while the study examined multiple feasibility outcomes of EW, it did not gather feedback from participants prior to or after the intervention (e.g., acceptability;

Ugalde et al., 2019). Future studies may consider doing focus groups with cancer ICs prior to and after the intervention to determine the best ways to recruit ICs, what type of intervention would appeal to ICs, and how the intervention can be improved. It will be especially important to conduct focus groups with ICs from different backgrounds (e.g., age, culture) as this may affect an intervention's acceptability and appropriateness. For instance, ICs who are more comfortable with expressing their emotions may be more receptive to EW.

Second, although the study attempted to reach a wide and diverse audience by using online sources and conducting the entire study remotely, the sample had limited demographics (e.g., mostly White, middle-income, older adults). Therefore, the generalizability of these findings are limited. Furthermore, the study only included breast cancer patients and caregivers. However, there are unique features of different types of cancers, which might impact the mechanisms by which EW operates. For instance, challenges surrounding sexuality and fertility are pervasive for breast cancer patients and ICs, particularly when they are a romantic couple (Campbell-Enns and Woodgate, 2017; Kemp et al., 2018). Perhaps one of the reasons why EW within ICs may benefit patients is by affecting the level of intimacy within the IC-patient relationship.

Third, while the study employed remote EW to optimize feasibility, it did not compare the feasibility of remote versus in-person EW. Although remote EW might have certain advantages over in-person EW (e.g., greater accessibility), perhaps in-person EW also has other advantages (e.g., personal connection with staff). Thus, it may be useful for future studies to compare the feasibility of different EW formats. Finally, given that the current study was a feasibility trial, its exploration of EW's efficacy in cancer ICs was only preliminary. Future research can conduct a large EW trial to thoroughly test the effects of EW on health and emotion regulation, and even whether emotion regulation mediates the potential effects of EW on health. Relatedly, it will be important to test the effects of IC outcomes on patient outcomes and vice versa using more stringent statistical techniques, such as dyadic data analysis, which accounts for dependency between partners (Kenny and Ledermann, 2010).

5. Conclusion

This study extended research on cancer IC interventions by examining the feasibility of remote EW and its preliminary efficacy in simultaneously improving cancer IC and patient health and enhancing cancer IC emotion regulation. Compared to prior cancer IC interventions, remote EW had relatively high screening, randomization, retention and treatment adherence, and similar treatment fidelity. However, it had relatively lower assessment process rates. Meanwhile, ICs in the EW group and their patients had relatively better mental health and physical health compared to ICs in the control group and their patients. Furthermore, ICs in the EW group had consistently lower levels of suppression, and higher reappraisal at least three months post-intervention. Taken together, these results suggest that there is some promise for EW's feasibility and efficacy with cancer ICs.

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Lameese Eldesouky: Writing – review & editing, Writing – original draft, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization. **James J. Gross:** Writing – review & editing, Supervision, Resources, Methodology, Investigation, Funding acquisition, Conceptualization.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Appendix A. Supplementary data

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